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Work Document 2X-10-05054



JD241960

12/08/2010 7:24 AM

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Document Number 2X-10-05054 O OPERATIONS SPECIAL PROCEDURE
 Work Item Title DISPOSE OF HTGR FUEL WASTE CONTAINERS IN GROUT CELL # 11

Record Status ACT
 Record Copy Printed Yes 3

Symptom, Problem, or Condition

About 60 waste containers (most in 85 or 110 gal overpacks) of High Temperature Gas Reactor (HTGR) fuel will be disposed in the mixed waste trench. Other STW waste that is not HTGR may be placed in this Cell. The waste containers will be placed and grouted in a monolith. Some of the over packs will require the top being removed to ensure grout fills the void. The containers will also have to be placed/spaced so to meet CPS-SW-008 and WMP-342-1.16 fissile areal density requirements.

Component Number

218W5T34

Component Name

TRENCH, AMW NO. 34

Temporary Component Number

N/A

Temporary Component Name

Location

Facility 2X
 System 32B

Charge Code

CACN COA
 N/A N/A

Building / Room 218-W-5-T34

Other N/A

N/A

Origination

Name Rosser, James R (Rick)

Phone (509) 372-0699

Date 08/03/2010

Screening Information

Phase Designator N/A Not Applicable

Priority 2 Priority Two

Mode A ANYTIME

Radiological Work Yes

Cognizant Engineer

Name Rosser, James R (Rick)

Phone (509) 372-0699

Resources Required

Code	Description	COCS	Role	No	Act Hr
04A	OPERATIONS PERSONNEL	R050	N/A	_____	_____
13	CRANE OPERATOR	R030	N/A	_____	_____
31	CEMENT FINISHER	C050	N/A	_____	_____
35	IRONWORKER/RIGGER	C090	N/A	_____	_____

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NEIC VP0928E01

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54	RADIOLOGICAL CONTROL TECHN' T050	N/A	_____	_____
93	ENGINEERING E130	N/A	_____	_____
OFS	OPERATIONS FIELD WORK SUPER' M010	N/A	_____	_____

Reference Documents

Category	Type	Description	Sheet	Coord	Revision
Reference	AJHA	2X-737			
Embedded File	L.L.	2008-RL-HNF-0034			
Reference	MSDS	3M Super 77 Classic Spray Adhesive (MSDS #010118A).			
Reference	MSDS	BASF GLENIUM-3030 (MSDS 063108)			
Reference	MSDS	BASF MBAE-90 (MSDS 060945),			
Reference	MSDS	BASF POZZOLITH NC-534 (MSDS 067353).			
Reference	MSDS	BASF POZZOLITH-80 (MSDS 067045)			
Reference	MSDS	CLASS F FLYASH (MSDS 062432)			
Reference	MSDS	DAPTEX LTX Foam Sealant (MSDS #057046)			
Reference	MSDS	PORTLAND CEMENT (MSDS 011987)			
Reference	MSDS	READY MIX CONCRETE (MSDS 064539)			
Reference	MSDS	Rheo TEC 2-60 (MSDS) 069396 CW 12/15/10			
Reference	MSDS	Safe Cure & Seal (J-18), Dayton Superior (MSDS 060947)			
Embedded File	PJOB	Pre-job			
Reference	RSF	SWSF-10-093			
Reference	RWP	SWP-001 & SWP- 007			
Embedded File	SD	Attachment #2			
Embedded File	SD	Work Record			
Embedded File	SKCH	Attachment #1a			
Embedded File	SKCH	Attachment #1b			
Embedded File	SD	Suspension Sheet	CW		12/8/10
Embedded File	WPC	Waste Planning Checklist	CW		12/8/10
Embedded File	USQ	SW-USQ-10-139	CW		12/8/10

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AJHA Review

Required Yes
 N/A

10/27/2010

NEPA Screening

Required See AJHA

Tech. Spec. / OSR Requirements Reference

Essential Systems

Code	Description
N/A	Not Applicable

Approvals

Code	Description	Approval	Date
CM	Cognizant Manager	Steen, Dick [Approved]	11/29/2010
CR	CRANE AND RIGGING PERSONNEL	Best, Keith M [Per Telecon]	11/19/2010
CS	Crit. Safety Rep./Crit. Safety Engineer	Ames, Randy [Approved]	11/19/2010
DA	Design Authority	Rosser, James R (Rick) [Approved]	11/18/2010
FWS	FIELD WORK SUPERVISOR	Arnold, Stuart G [Approved]	11/19/2010
I	Industrial Hygiene & Safety	Sweesy, Jason J [Approved]	11/22/2010
OPS	Operations	Conley, Jeffrey A [Approved]	11/19/2010
R	Radiation Protection	Miller, John L [Approved]	11/19/2010

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 Work Item Title DISPOSE OF HTGR FUEL WASTE CONTAINERS IN GROUT CELL # 11

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HRB Required Required No Wheatley, Carla J [Approved] 10/27/2010		USQ Screening Required USQ SW-USQ-10-139 See USQ Form 11/17/2010	
Pre-Work Review Approval STUART ARNOLD Date 12/16/10		Person In Charge Name Arnold, Stuart G Phone (509) 373-5613	
Work Release Release Type F FULL RELEASE Approval STUART ARNOLD Date 12/16/10		Tagout Information Number N/A Location N/A	
Work Suspended? <input type="checkbox"/>			

Resolution / Retest
 (Resolution Embedded)

Resolution By
 Approval Wheatley, Carla J [Approved] Date 11/19/2010

Calibrated Standards/Equipment Standard/Equipment N/A Exp Date _____ _____ _____ _____		Field Work Complete Approval _____ Date _____ Operations Acceptance Approval _____ Date _____	
---	--	--	--

Post Work Review

Work Record Feedback Exists? ☐

Code	Description	Approval	Date
CE	Cognizant Engineer	_____	_____

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POSTRVW Post-Work Review

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CW 12/8/10

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DISPOSE OF HTGR FUEL WASTE CONTAINERS IN GROUT CELL # 11		
2X-10-05054/W	Work Instructions WCN #2	Page 1 of 10

1.0 SCOPE:

These work instructions give directions for creating Grout Cell #11, placing waste in the cell, and grouting the waste containers. Grout Cell #11 is located on top of the Uranium Fuel Monolith in Trench 34. The encasement is accomplished by grout placement over the waste containers in forms which use Ecology Blocks and a plastic liner.

2.0 SPECIAL MATERIAL, TOOLS & EQUIPMENT:

NOTE: *The below list is not all inclusive additional tools, material equipment may be used per FWS direction and properly evaluated.*

- Grout (various MSDS's, see AJHA & Work Document)
- Safe Cure & Seal (J-18) (See AJHA & Work Document)
- L & M Construction Chemical E-Con (See AJHA & Work Document)
- 3M Super 77 Classic Spray Adhesive (See AJHA & Work Document)
- DAPTEX LTX Foam Sealant (See AJHA & Work Document)
- Concrete tools to move grout
- Sand bags
- Ecology Blocks (weight is approximately 3500 lbs. each)
- Screed pins with safety caps
- Plastic sheeting, nylon reinforced PVC sheet 10 mil thick
- Visqueen or equivalent polyethylene sheets, 6 mil thick x 20' x 100' roll
- Splash Goggles
- NITRILE gloves
- Safety glasses

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3.0 PRECAUTIONS & LIMITATIONS:

3.1 Radiological Controls:

- 3.1.1 If RWP "Void Limits" are exceeded, stop work; assure workers are placed in a safe location (e.g. upwind and away from the source term) and contact Management.

3.2 Occupational Safety & Industrial Hygiene Controls:

- 3.2.1 See controls specified in SW-100-141.
- 3.2.2 Per PRC-RD-SH-24243 "Portable Ladders". Portable ladders use is permissible only if all other methods have been evaluated: Line management and Safety have evaluated ladder use for the task of un-hooking the shackle from the Eco-Blocks after it's placement and have found it to be permissible. See Analysis notes.
- 3.2.3 Hearing protection with NRR \geq 25 shall be utilized in the vicinity (25 feet) of the noise producers.
- 3.2.4 NITRILE gloves are to be worn under leather outer gloves.
- 3.2.5 During application or use of Safe Cure & Seal (J-18), L & M Construction Chemical E-Con, Eye/face protection- splash goggles (cover type) with a chemical splash face shield is required.
- 3.2.6 During placement of grout, safety glasses and NITRILE gloves are required.
- 3.2.7 If animals, snakes, insects or rodent droppings are encountered during the performance of this evolution work shall be STOPPED and PRC-PRO-SH-40143, *Biological Hazards*, shall be initiated.

3.3 Technical Safety Requirements (TSR):

- 3.3.1 See controls specified in SW-100-141.

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DISPOSE OF HTGR FUEL WASTE CONTAINERS IN GROUT CELL # 11		
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3.4 Environmental / Air Permitting Controls:

3.4.1 See controls specified in SW-100-141.

3.5 Criticality Safety Controls:

3.5.1 See controls specified in SW-100-141. Waste containers have been placed per CPS-SW-008; see ACF SWOC 10-05 Rev 0.

3.6 Additional / Other Precautions & Limitations:

- If any discrepancies, difficulties or delays are encountered which cannot be resolved within the scope of these work instructions, STOP work and immediately notify the FWS and document on the Work Record.
- Workplace hazards, along with methods to mitigate each identified hazard are documented on **AJHA 2X-737**. The hazards and controls are incorporated in the work instructions. If a new hazard is identified during the course of performing these work instructions, THEN stop the work activity, notify the FWS and resolve the issue with the appropriate Subject Matter Expert(s) (SME).
- If you encounter an unknown odor or substance, stop work activities immediately, move all personnel at least 300 feet upwind, establish a boundary and call 911 (or cellular 373-0911)

[Safety Bulletin SSB-024]

- The Ecology Blocks used in the performance of this work package shall be inspected and tagged by Crane and Rigging

[LL: 2008-RL-HNF-0034]

- Be alert to overhead lines. Some lines are as low as 15' and may be snagged if equipment is extended while traveling.
- When in transit under overhead lines, vehicle structures must be lowered to maintain a minimum of 4' clearance between equipment and overhead power lines and a minimum distance of no contact with non-energized lines.

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- The ability to perform this work is dependent on temperature range. Engineering will make recommendations and approval for work to commence in regard to the placement of grout utilizing weather forecasts and ambient temperatures.
- All vehicles used to perform operations and routine surveillance shall be equipped with a portable fire extinguisher, a shovel, and a radio. Vehicles without this equipment shall either be accompanied by a vehicle with the required equipment or shall remain outside the posted perimeter.
- Concrete Ecology Blocks shall be inspected and tagged for use by Hoisting & Rigging. Weight is approximately 3500 lbs each.
- When using portable hand tools, the GFCI shall be tested in accordance with the manufacturer's instructions.

3.7 While performing this work package , if a condition outside the identified scope occurs (off-normal condition), then respond as follows:

- Stop Work
- Warn personnel in affected and adjacent work areas.
- Isolate affected area by completing the following:
 - Secure boundary.
 - Access is controlled, so personnel will not enter affected area.
- Minimize exposure by implementing appropriate As Low As Reasonably Achievable (ALARA) principles (time, distance, shielding and personnel equipment).
- Notify Shift Duty Officer (SDO).
 - SDO request Building Emergency Director (BED) to initiate Off-Normal Condition response actions at Central Waste Complex (CWC)/Low Level Burial Grounds (LLBG).

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DISPOSE OF HTGR FUEL WASTE CONTAINERS IN GROUT CELL # 11		
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4.0 PREREQUISITES:

4.1 Pre-Start Items:

- A walk down will be performed by the FWS to ensure overhead lines and/or obstacles are mitigated prior to movement of the crane into and exiting the SWSD Burial Ground boundary. This will be documented on the Work Record.
- FWS to ensure the unloading area and transport route have been inspected for obstacles that could interfere with equipment operation.
- Ensure Ecology blocks used in performance of the work are certified and have been inspected and tagged by Crane and Rigging.

[LL: 2008-RL-HNF-0034]

5.0 WORK STEPS:

NOTE:

- *Pre-Job Briefing and Post-Job Reviews to be conducted in accordance with PRC-PRO-WKM-14047.*
- *The following step regarding Waste Disposal may be performed at anytime throughout these work instructions.*

- 5.1 Waste disposition to be handled as per the Waste Planning Checklist (WPC).
- 5.2 HPT perform dose rate survey and LAW contamination survey of the work areas, as appropriate, to establish radiological conditions.

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DISPOSE OF HTGR FUEL WASTE CONTAINERS IN GROUT CELL # 11		
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GROUT CELL FORM WALLS

NOTE: During the construction/de-construction of the cell walls, the Crane/Rigging Designated Lead (DL) may authorize the rigging crew to work on top of the Eco-Blocks.

- 5.3 DL inspect the wall prior to access to ensure there is no hidden tripping/fall hazards, and that the blocks are free from material defect, debris or other conditions that create an unsafe walking condition .

WARNING

- Attention is needed when working near the Ecology blocks from the waste in the trench. There is a 12 inch gap between the blocks and the waste that has been previously placed in the cell.
- The blocks that the worker will be standing on are to be no more than one (1) block high, and less than six (6) feet fall hazard on all sides.
- At no time shall the worker be authorized to jump down from the wall.
- The top of the wall is NOT to be used as a transit route.

NOTE: Steps 5.4 through 5.11 performed or repeated in any sequence, per FWS direction.

- 5.4 Place Ecology Blocks in stages as required, allowing for waste container placement.
- 5.5 Form grout cell walls as shown on Attachment #1, staggering blocks to ensure they are interlocked.
- 5.6 Prior to placing the grout form liner, DL to ensure the blocks are not covered in any manner and that an egress method has been provided to the worker.

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DISPOSE OF HTGR FUEL WASTE CONTAINERS IN GROUT CELL # 11		
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- 5.7 Place the grout form liner per FWS direction using plastic sheeting.
- 5.8 Lift the liner over the ecology blocks.
- 5.9 Place waste containers in Grout Cell in accordance with SW-100-141 and Attachment #1
- 5.10 Place Ecology blocks or sand bags on top of blocks to secure liner leaving approximately 10' spacing between blocks.
- 5.11 Engineer to ensure plastic sheeting is properly installed and there are no leak paths for grout to escape from the form, and record on Attachment #2.

Grout Lift #1

NOTE: *Grout Lift #1 is intended to lock in waste packages and to prevent containers from floating in subsequent lifts.*

- 5.12 Engineer to ensure each grout trip ticket, provided by driver, meets acceptance criteria. Engineer shall sign each trip ticket and provide it to FWS for inclusion in the work package.
- 5.13 Pour grout lift #1 approximately 6" thick.
- 5.14 Engineer to ensure grout lift depth is correct and grout has been placed on all sides of the containers, record on Attachment #2.

NOTE: *The 48 hour grout cure time requirement can be reduced with engineer's concurrence and documentation on work record.*

- 5.15 Allow a minimum of 48 hours for grout to cure prior to pouring next lift.

DISPOSE OF HTGR FUEL WASTE CONTAINERS IN GROUT CELL # 11		
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Grout Lift #2

NOTE: *After Lift #1 the grout cell was extended ~30 feet to the South to place HTGR boxes and two drums.*

- 5.16 Engineer to ensure each grout trip ticket, provided by driver, meets acceptance criteria. Engineer shall sign each trip ticket and provide it to FWS for inclusion in the work package.
- 5.17 Form grout cell walls as shown on Attachment #1a.
- 5.18 Pour grout lift #2 in two phases:
 - a) Pour first phase to a depth of 6 inches in the extended Southern end of the cell. Remaining grout in the truck will be poured in the Northern end of the cell.
 - b) After 4 hours or more curing time, pour second phase so that depth of grout for entire cell is equal (approximately 20 inches total depth).
- 5.19 Engineer to ensure grout lift depth is correct and grout has been placed on all sides of the containers, record on Attachment #2.

NOTE: *The 48 hour grout cure time requirement can be reduced with engineer's concurrence and documentation on work record.*

- 5.20 Allow a minimum of 48 hours for grout to cure prior to pouring next lift.

Grout Lift #3

- 5.21 Engineer to ensure each grout trip ticket, provided by driver, meets acceptance criteria. Engineer shall sign each trip ticket and provide it to FWS for inclusion in the work package.
- 5.22 Pour grout lift #3 approximately 14" thick.
- 5.23 Engineer to ensure grout lift depth is correct and grout has been placed on all sides of the containers, record on Attachment #2.

DISPOSE OF HTGR FUEL WASTE CONTAINERS IN GROUT CELL # 11		
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NOTE: *The 48 hour grout cure time requirement can be reduced with engineer's concurrence and documentation on work record.*

5.24 Allow a minimum of 48 hours for grout to cure prior to pouring next lift.

Grout Lift #4

5.25 Place screed pins (if required) with safety cap where waste is not located as identified by the Engineer or Concrete Finisher.

5.26 Engineer to ensure each grout trip ticket, provided by driver, meets acceptance criteria. Engineer shall sign each trip ticket and provide it to FWS for inclusion in the work package.

5.27 Pour grout lift #4 approximately 14" thick.

NOTE: *Nitrile gloves & goggles will be worn when applying evaporative retarder and/or curing compound.*

WARNING

The concrete finishing tools required to perform these work instructions have long handles and there is the potential for on-lookers to be impacted by them during the finishing process. Personnel who are not directly involved in the finishing process are to keep their distance.

5.28 Apply evaporative retarder and/or curing compound during grout placement as directed by the Engineer or Concrete Finisher.

5.29 Screed grout level, remove screed pins (if required), as grout placement progresses, and apply a float finish as directed by the Engineer or Concrete Finisher.

5.30 Engineer to ensure grout lift depth is correct and grout has been placed on all sides of the containers, record on Attachment #2.

5.31 Place Visqueen on top of the final grout lift and secure with sandbags as directed by the FWS.

DISPOSE OF HTGR FUEL WASTE CONTAINERS IN GROUT CELL # 11		
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5.32 Allow 7 days for grout to cure.

Form Removal

NOTE: During the construction/de-construction of the cell walls, the Crane/Rigging Designated Lead (DL) may authorize the rigging crew to work on top of the Eco-Blocks.

5.33 DL inspect the wall prior to access to ensure there is no hidden tripping/fall hazards, and that the blocks are free from material defect, debris or other conditions that create an unsafe walking condition.

WARNING

- Attention is needed when working near the Ecology blocks from the waste in the trench. There is a 12 inch gap between the blocks and the waste that has been previously placed in the cell.
- The blocks that the worker will be standing on are to be no more than one (1) block high, and less than six (6) feet fall hazard on all sides.
- At no time shall the worker be authorized to jump down from the wall.
- The top of the wall is NOT to be used as a transit route.

5.34 DL inspect the wall prior to access to ensure there is no hidden tripping/fall hazards, and that the blocks are free from material defect, debris or other conditions that create an unsafe walking condition.

5.35 DL ensure the blocks are not covered in any manner and that an egress method has been provided to the worker.

5.36 Remove the Visqueen, if required, from the top of the cell.

5.37 Install fall protection barrier per manufacturer's instructions, and FWS direction.



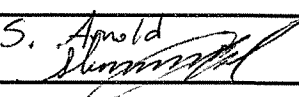
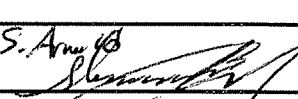
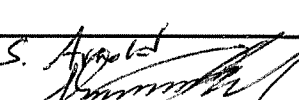

5.38 Remove forms and liner as directed by the FWS.


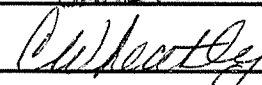
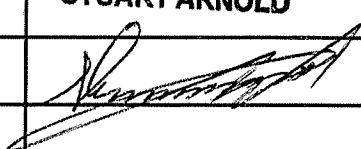
6.0 RESTORATION & TESTING:

6.1 Perform housekeeping/clean-up of the work area.

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CHPRC WORK RECORD				1. Document Number: 2X-10-05054/W	
2. Work Item Title: DISPOSE OF HTGR FUEL DRUMS IN CELL #11					
Date	Turnover, Problem Description, Action Taken	Feed-Back (X)	Name	Craft/Resource Type	Hours
11/19/10	Peer Review.				
DEC 08 2010	PEER REVIEW COMPLETE		Ray Weber 	PLWR	
12/16/10	Completed pre-job & job site walkdown with the work crew. Placed 52 HTGR drums in grout cell #11.			NCO	24
				RET	16
				FWS	8
				Riggers	32
	Started forming eco-block wall on North and west sides.			Crane operator	8
			S. Arnold 		
12/17/10	Completed pre-job & site walkdown with work crew. Completed forming the west and south sides of grout cell with eco blocks.			NCO	8
				FWS	4
				Riggers	12
			S. Arnold 	Crane operator	4
1/3/11	Completed pre-job & site walkdown with work crew. Completed placing eco-blocks on top of existing east wall in accordance with attachment #1.			NCO	18
				Riggers	18
				Crane op.	6
				Teamster	12
				FWS	6
			S. Arnold 		
1/19/11	Placed visqueen in Grout Cell after pre-job meeting		WILLIAM R. SWIFT 	ANCOs	24RS

CHPRC WORK RECORD				1. Document Number: 2X-10-05054/W	
2. Work Item Title: DISPOSE OF HTGR FUEL DRUMS IN CELL #11					
Date	Turnover, Problem Description, Action Taken	Feed-Back (X)	Name	Craft/Resource Type	Hours
2/14/11	Completed pre-job & site			NCO	32
	walkdown with the work			Ret	8
	crew. Placed approximately			FWS	8
	6 inches of grout around				
	the 52 HTGR drums in				
	The grout cell to complete		STUART ARNOLD		
	grout lift #1.				
3/2/11	Incorporated WEN #1 to				
	add Attachment 1a and		CARLA WHEATLEY		
	change steps 5.16 thru 5.19.				
3/3/11	Completed pre-job & site			NCO	8
	walkdown with the work crew.			Ret	8
	Placed the 8 HTGR boxes and			FWS	4
	drums 0045900 & 0074735 in			Rigger	16
	South end of grout cell in			Crane op.	4
	accordance with Sketch 1a.				
	Re-configured eco blocks in		STUART ARNOLD		
	accordance with Sketch 1a.				

CHPRC WORK RECORD				1. Document Number: 2X-10-05054/W	
2. Work Item Title: DISPOSE OF HTGR FUEL DRUMS IN CELL #11					
Date	Turnover, Problem Description, Action Taken	Feed-Back (X)	Name	Craft/Resource Type	Hours
3/8/11	Completed pre-job and Site walkdown with work crew.			NCO	32
	Placed approximately 6 inches of grout between remaining boxes and drums to complete grout lift #2 phase 1.		STUART ARNOLD	Act	8
				FWS	8
3/9/11	Completed pre-job and Site walkdown with work crew.			NCO	16
	Placed approximately 14 inches of grout between Boxes & Drums to complete grout lift #2 phase 2.		STUART ARNOLD	Act	4
				FWS	4
3/9/11	Removed Step 6.2 (Perform Post-alara/Post-Job review), not required for this package.		Carla Wheatley		
			CARLA WHEATLEY		
3/9/11	Incorporated WCN #2.		Carla Wheatley		
			CARLA WHEATLEY		

USQ Number

SW-USQ-10-139

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Title: 2X-10-05054/W, Dispose of HTGR Fuel Drums in Grout Cell #11

Applicable Facilities/Packaging System/Transportation Activity: Low Level Burial Grounds (LLBG)

Scope: Work package 2X-10-05054 gives directions for the grout encasement of waste containers in Grout Cell #11 in MWT-34. The encasement is accomplished by grout placement over the waste containers in forms which include Ecology Blocks. This package has the same scope as approved in previous work packages 2X-08-5951, 2X-09-01473, 2X-09-01476, and 2X-09-06420.

Description: Grout Cell #11 will be formed in MWT-34, as part of other previously formed grout cell monoliths. The HTGR fuel drums will be placed in a designated area on top of the existing uranium fuel monolith as directed by the waste loading attachment and ACF SWOC-10-05, *Disposal of High Temperature Gas Reactor (HTGR) Fuel*. (Because of the high FGE content of the HTGR containers, the ACF reviewed the limits and controls imposed by CSER 03-014 rev. 0A. The review demonstrated that the proposed disposal plan is fully compliant with the CSER 03-014 with no additional controls.) Ecology blocks, existing grout monolith walls, and wood are used to make the grout cell forms. Ecology blocks may be stacked from one to two high, where required, to make part of the form. Grout, which meets the leach index and compression strength criteria of the U. S. Nuclear Regulatory Commission (NRC) *Technical Position Paper on Waste Form*, Section C.2 and Appendix A, will be poured into the cell. The grout will be poured in lifts from 6 to approximately 14 inches deep to encase the waste containers. The final encasement will meet the stabilization requirements of WHC-EP-0645, *Performance Assessment for the Disposal of LLW in the 200 West Area Burial Grounds* and DOE O 435.1. The materials used for the form will be removed after the grout has cured.

Safety Basis Documentation Reviewed: SWOC Safety Basis:

- CHPRC Safety Management Programs (SMP), HNF-11724 [Rev. 6A]
- 09-SED-0108, SER for HNF-11724 [Rev 6]
- SWOC Master Documented Safety Analysis (MDSA), HNF-14741 [Rev. 7]
- SWOC Technical Safety Requirements (TSR), HNF-15280 [Rev. 7]
- 10-SED-0134, SER for MDSA/TSR Rev 7
- Solid Waste Operations Complex Drum Lid Release Justification for Continued Operation, CHPRC-00971, Rev. 0
- 10-SED-0179, SER for JCO

Submitted but not Approved:

- CHPRC Safety Management Program (SMP), HNF-11724 [Rev. 7]

A review was conducted of safety basis documentation that has been submitted but not approved, approved but not implemented, and currently implemented safety basis documentation to determine the impact of this proposed change. All of this documentation was considered in preparing the answers to the questions presented by this USQ review, however only the currently approved and implemented Safety Basis was used to determine the answers to the questions below. Unless otherwise noted, implementation of the not approved Safety Basis will not affect the answers.

Other References: SW-USQ-09-121

1. Could the proposed activity represent a change to the facility, packaging system, or procedures as described in the Safety Basis?

☒ No ☐ Yes

Basis: The process description for the LLBG in HNF-14741, Section 2.5.2.26, describes encasement of waste and states, "Encasement is performed by surrounding, or encasing, a waste container or containers with grout or concrete. The grout or concrete formulations used are determined based on radionuclides present in the waste. Encasement of waste results in a solid, freestanding waste form, or monolith that satisfies performance objectives listed in DOE O 435.1". The activities of the work package (or future work packages with the same work scope of

A-6004-789 (REV 4)

CHPRC UNVIEWED SAFETY QUESTION - U SCREENING

USQ Number
SW-USQ-10-139

Page 2 of 2

grout encasement) are described in the safety basis and could not represent a change to the facility or procedures described in the safety basis.

2. Could the proposed activity represent conditions (e.g., new or changed hazards) that have not been analyzed in the Safety Basis?

☒ No ☐ Yes

Basis: Chapter 3 of HNF-14741 describes the types of accidents, developed from the hazard analysis of described activities, which could occur during performance of those activities in the burial grounds. The activities of this scope of work (in this work package and future work packages) are described in the safety basis, including the waste handling which will be accomplished using approved procedures. The approved activities of the work scope could result in waste package drops, container punctures, mechanical impact or other events that could release the package contents. Sections 3.4.2.2 for FIR-2 (small outside fire) accidents, 3.4.2.3, for FIR-3 (medium outside fire) accidents, 3.4.2.4 for FIR-4 (large outside fire) accidents, 3.4.2.13 for SP-2 (single container spill) accidents, and 3.4.2.14 for SP-3 (multiple container spill) accidents all state that these fire/spill scenarios and analysis bound these types of accidents. The work scope activities could not represent any new conditions, and the hazards that do exist have been analyzed in the safety basis.

3. Could the proposed activity represent a test or experiment not described in the Safety Basis?

☒ No ☐ Yes

Basis: The scope of the activities in the work package has been performed previously in the LLBG and is described in the safety basis. As previously stated in question 1, Section 2.5.2.26 of HNF-14741 describes encasement of waste. The work scope could not represent a test or experiment not described in the Safety Basis.

Conclusion:

☒ The proposed activity screens negative and no USQ Determination is required.

☐ The proposed activity screens positive and a USQ Determination is required.

Transportation Safety USQ review required? ☒ No ☐ Yes, Forward to Transportation Safety Organization.

USQ Screener #1

USQ Screener #2

JR Rosser

MD Peterson

(Print Name)

(Print Name)

Signature

Date:

11/17/10

Signature

Date:

11/17/10

OTHER REVIEWS (If Required)

Print and Sign: NA

Date:

Print and Sign: NA

Date:

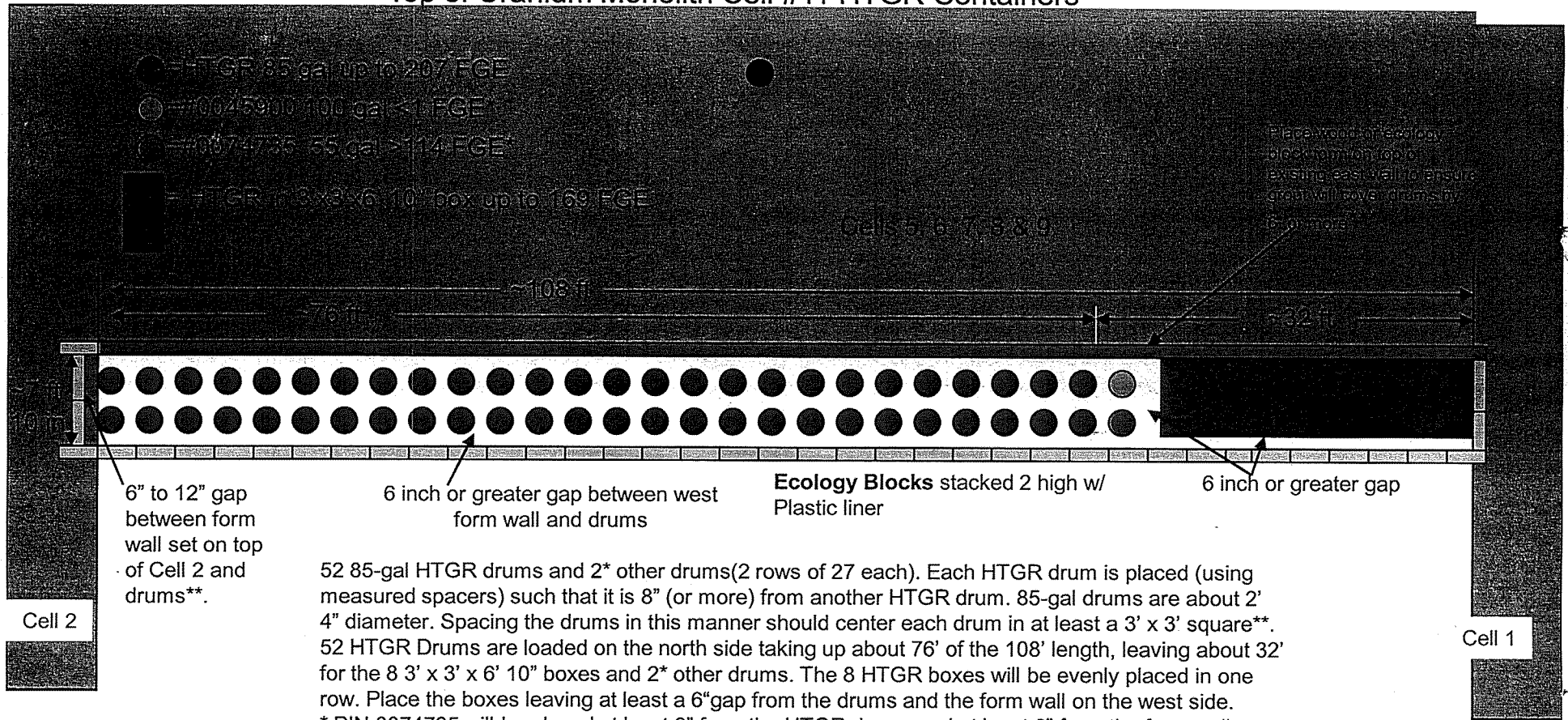
COPY



2X-10-05054 Attachment #1a

Not to Scale

Top of Uranium Monolith Cell #11 HTGR Containers



52 85-gal HTGR drums and 2* other drums (2 rows of 27 each). Each HTGR drum is placed (using measured spacers) such that it is 8" (or more) from another HTGR drum. 85-gal drums are about 2' 4" diameter. Spacing the drums in this manner should center each drum in at least a 3' x 3' square**. 52 HTGR Drums are loaded on the north side taking up about 76' of the 108' length, leaving about 32' for the 8 3' x 3' x 6' 10" boxes and 2* other drums. The 8 HTGR boxes will be evenly placed in one row. Place the boxes leaving at least a 6" gap from the drums and the form wall on the west side.

* PIN 0074735 will be placed at least 9" from the HTGR drums and at least 6" from the form wall on the west side. *PIN 0045900 has less than 1 FGE and will have no spacing requirements from other containers. (note these two containers may or may not be placed in the form.)

**There are no minimum spacing requirements between the existing monolith walls on the north, east, and south sides and the HTGR drums and boxes because a 6" gap already exists at these locations from previous monolith pours. But, because the drums on the north side will be higher than the existing (Cell 2) wall the form wall on the north side will have to sit back 6" to 12" to ensure the drums on that side are covered with grout. The drums and boxes will then be locked in place with a ~6 to 10 inch grout pour.

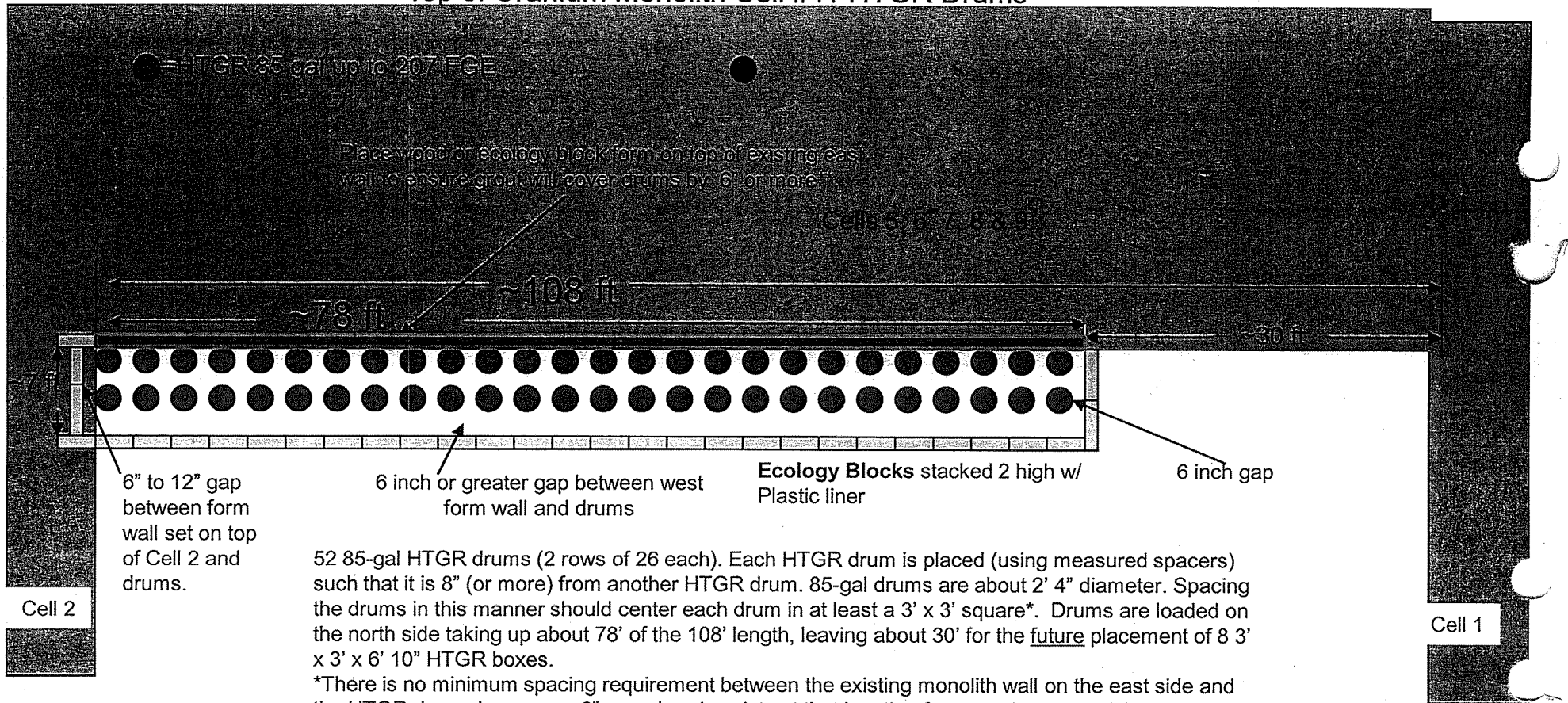
***Existing east wall varies from 42" to 46" in height. To ensure the 39" tall drums are covered with 6' or more of grout, extra forming material will have to be placed along the top of the east wall.

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Not to Scale

2X-10-05054 Attachment #1
Top of Uranium Monolith Cell #11 HTGR Drums

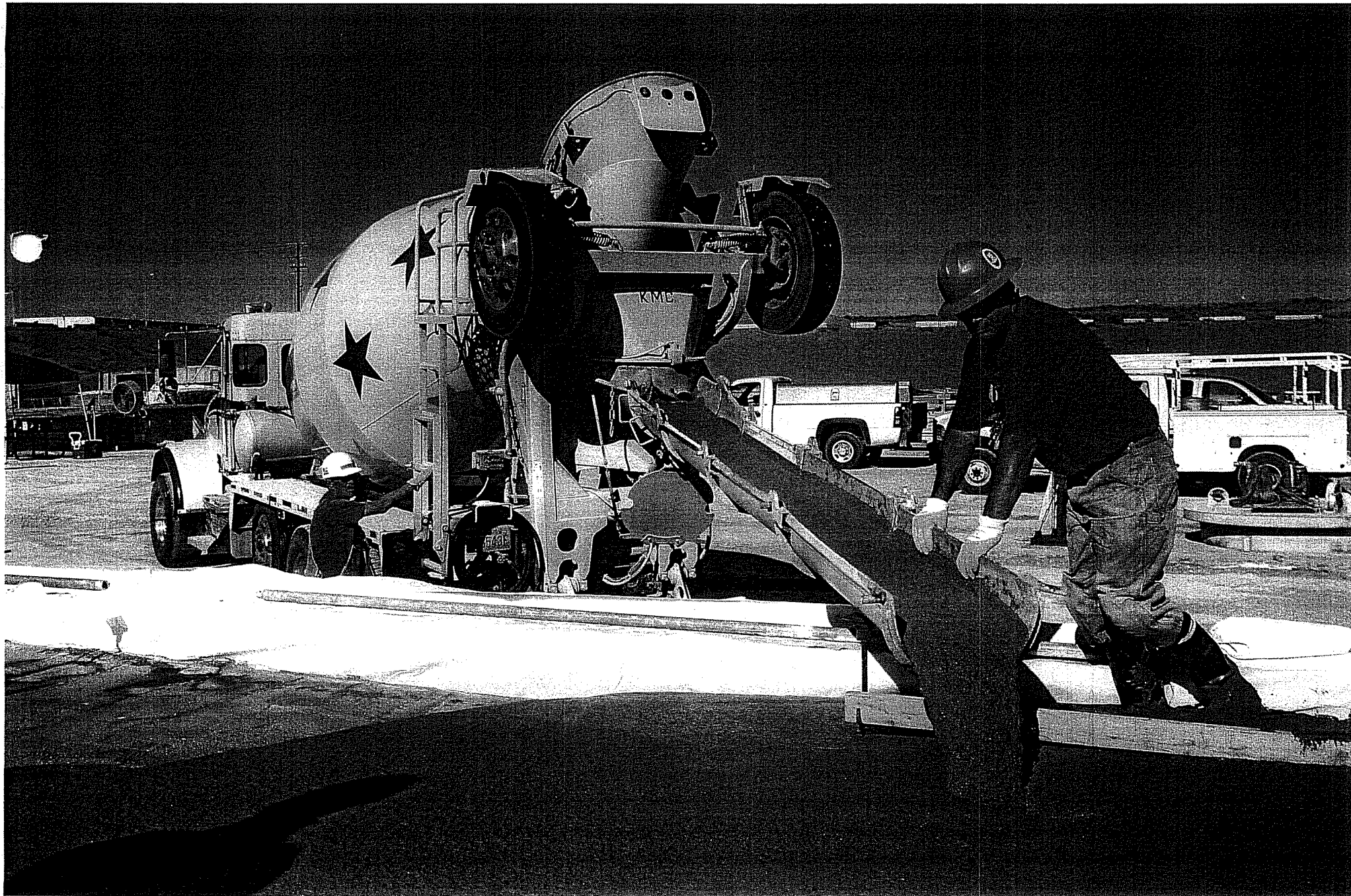


52 85-gal HTGR drums (2 rows of 26 each). Each HTGR drum is placed (using measured spacers) such that it is 8" (or more) from another HTGR drum. 85-gal drums are about 2' 4" diameter. Spacing the drums in this manner should center each drum in at least a 3' x 3' square*. Drums are loaded on the north side taking up about 78' of the 108' length, leaving about 30' for the future placement of 8 3' x 3' x 6' 10" HTGR boxes.

*There is no minimum spacing requirement between the existing monolith wall on the east side and the HTGR drums because a 6" gap already exists at that location from previous monolith pours. The drums will then be locked in place with a ~6 to 10 inch deep grout pour.

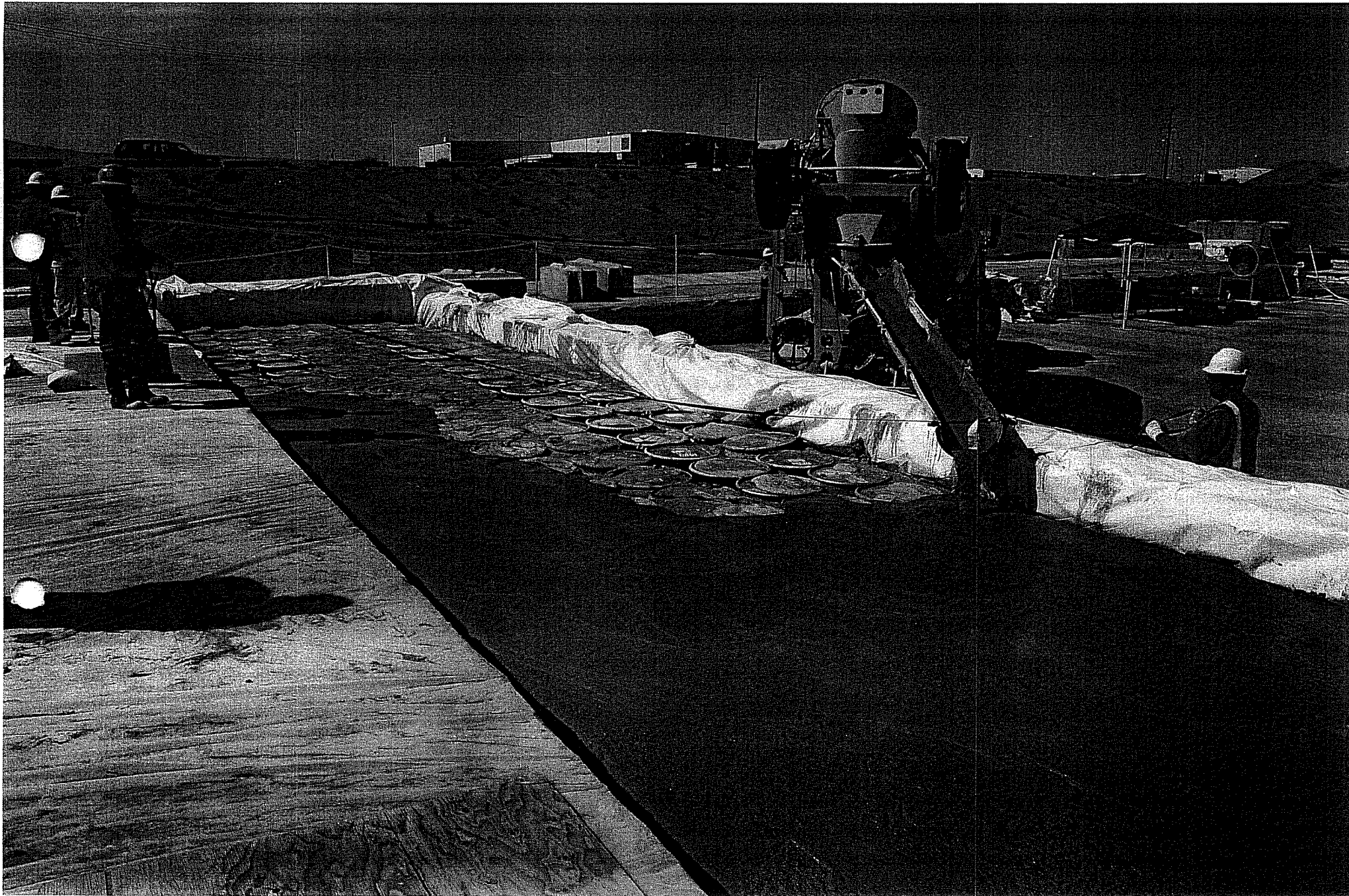
**Existing east wall varies from 42" to 46" in height. To ensure the 39" tall drums are covered with 6' or more of grout, extra forming material will have to be placed along the top of the east wall.

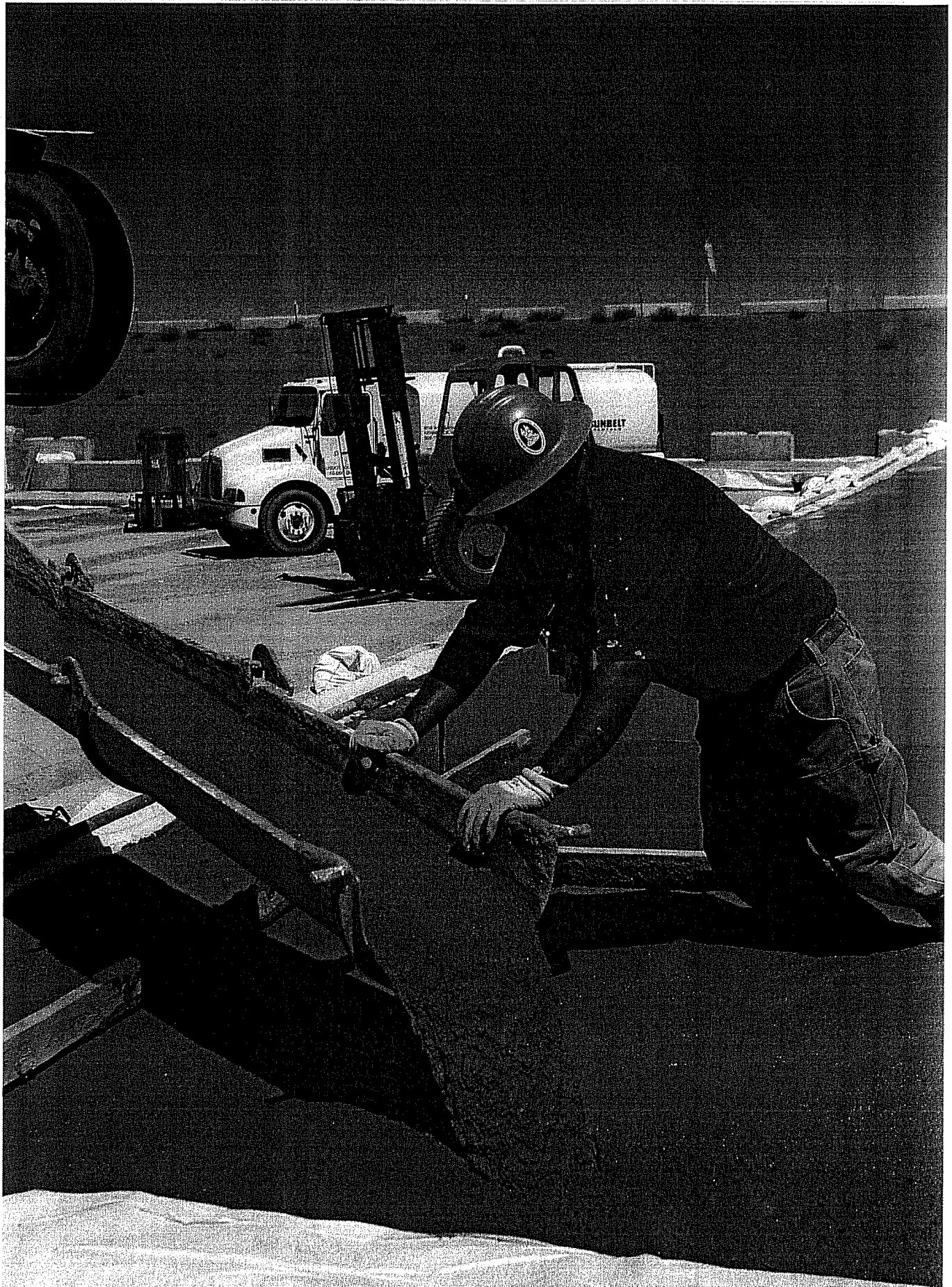


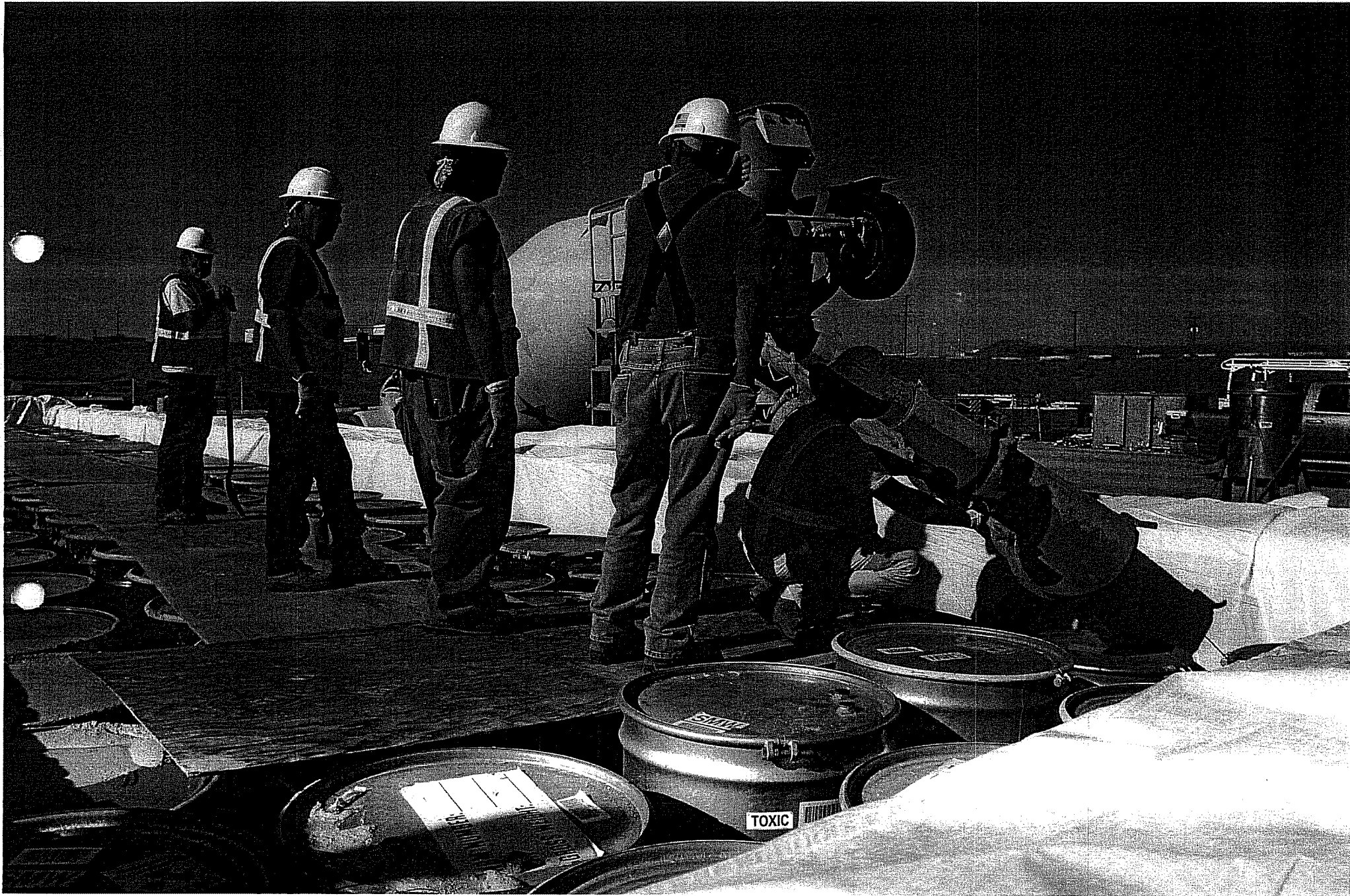








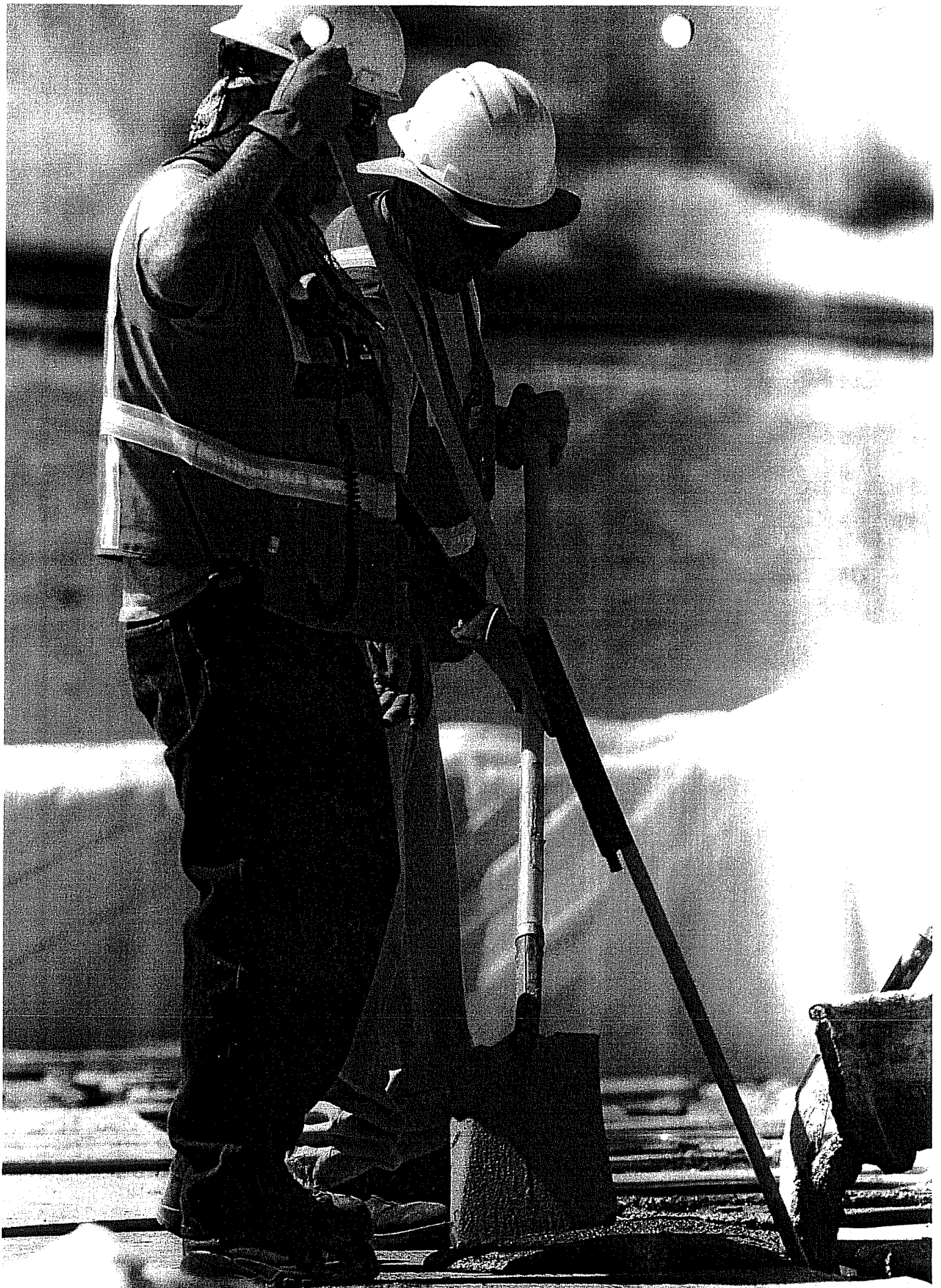






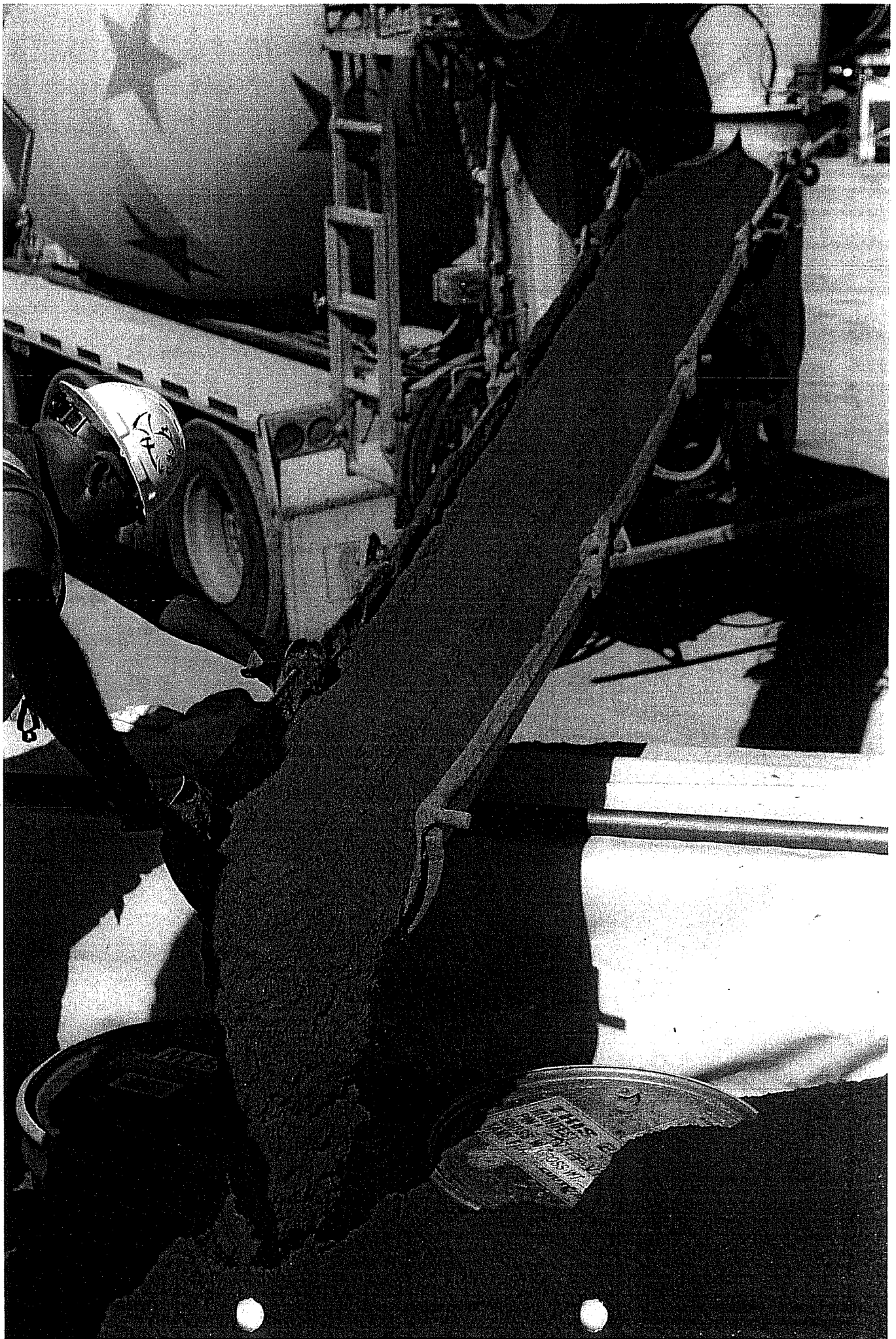


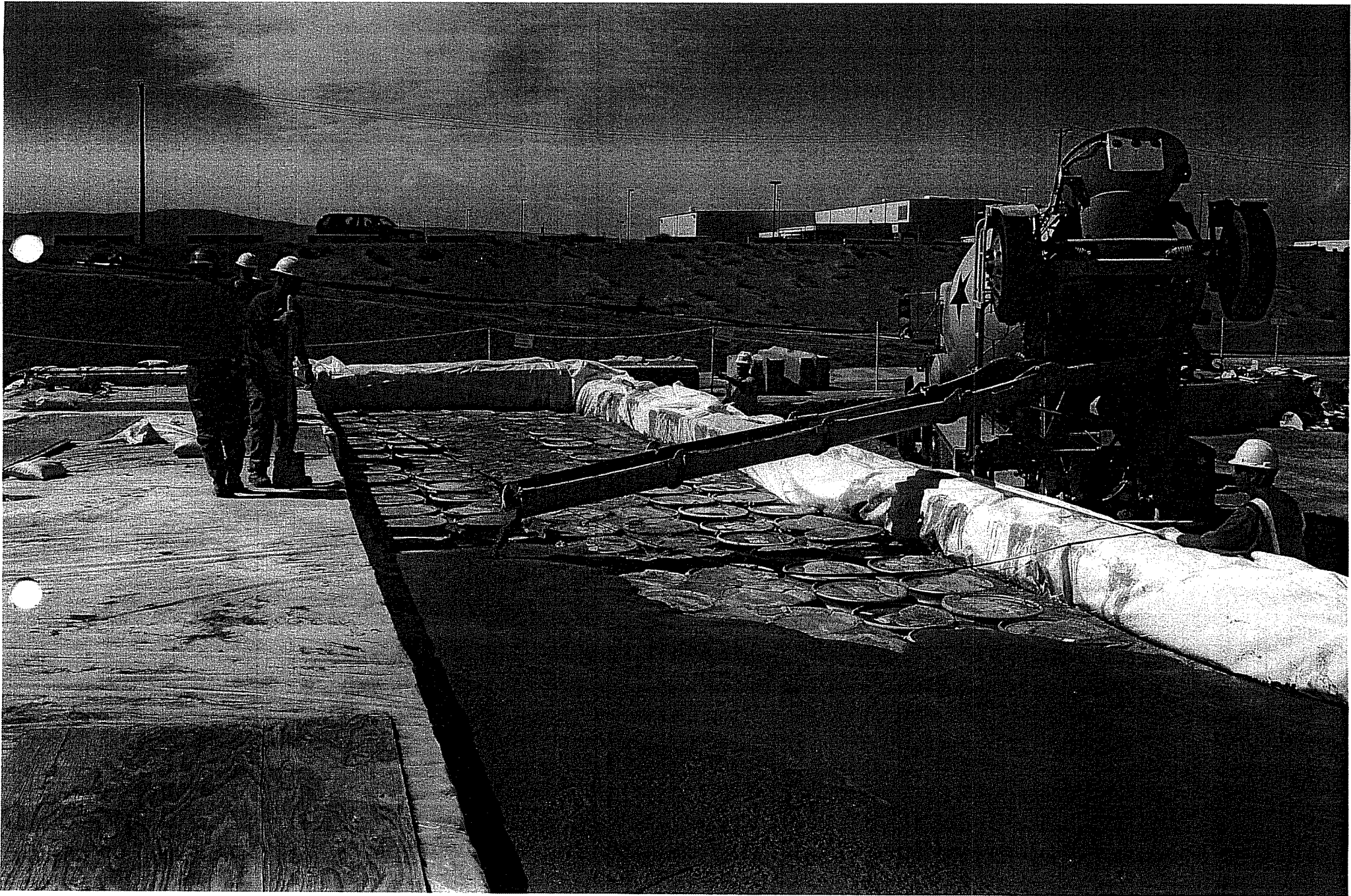






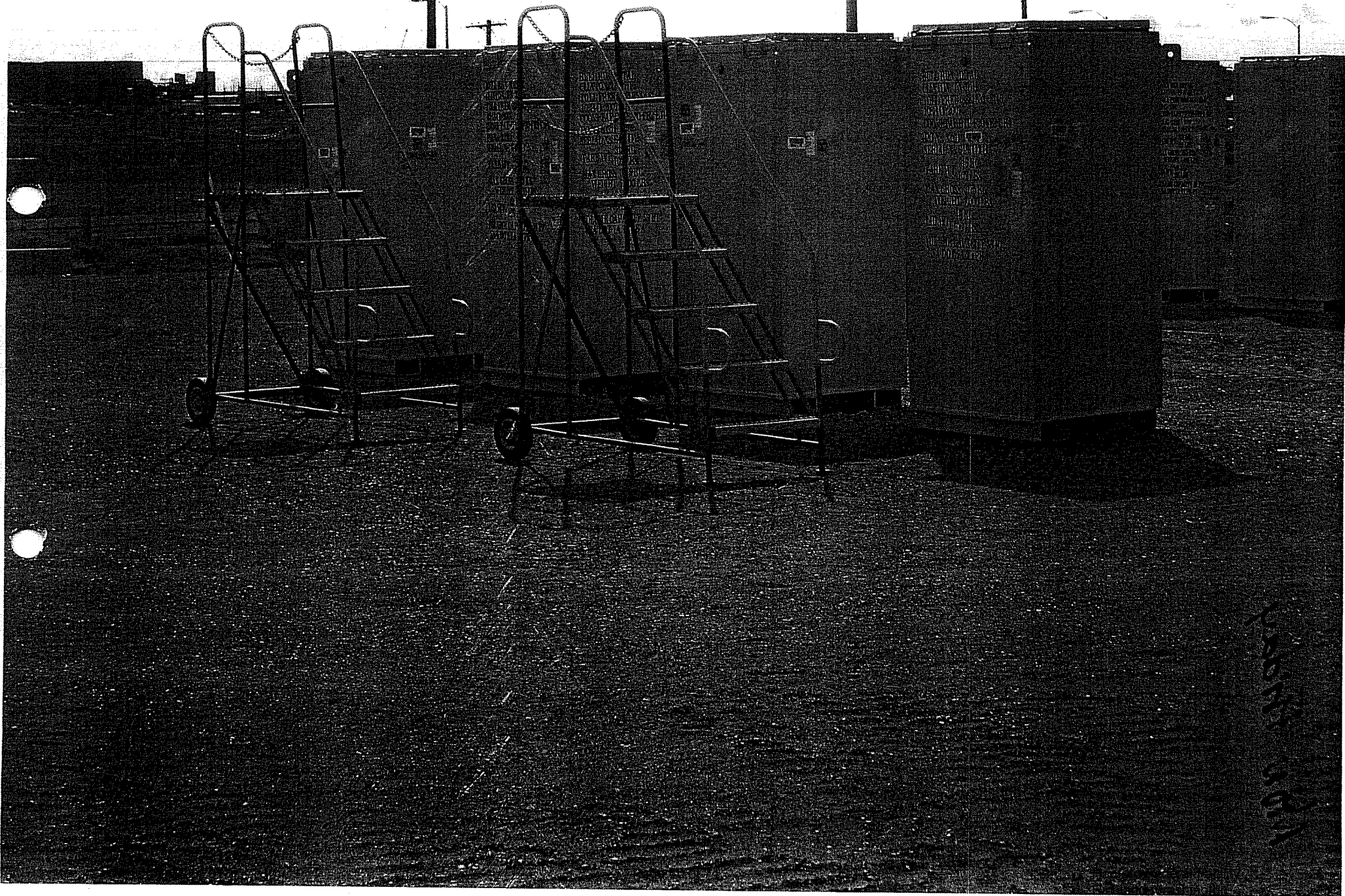








APPENDIX Z



2014 081

DISPOSE OF HTGR FUEL DRUMS & WASTE BOXES IN GROUT CELL #11

2X-10-05054/W

Attachment #2

Page 1 of 2

- 6.13 Ensure plastic sheeting is properly installed and there are no leak paths for grout to escape from the form.

For cell extension / J. R. Mosser 3/8/11
 Engineer R. T. Steen / R. T. Steen / 2/14/11
 Signature Print Date

Grout Lift #1

- 6.16 Ensure grout lift depth is correct and grout has been placed on all sides of the containers.

Engineer R. T. Steen / R. T. Steen / 2/14/11
 Signature Print Date

Grout Lift #2

- 6.20 Ensure grout lift depth is correct and grout has been placed on all sides of the containers.

Phase 1 J. R. Mosser / J. R. Mosser / 3/8/11
 Engineer J. R. Mosser / J. R. Mosser / 3/9/11
 Signature Print Date

Grout Lift #3

- 6.24 Ensure grout lift depth is correct and grout has been placed on all sides of the containers.

Engineer J. R. Mosser / J. R. Mosser / 3/10/11
 Signature Print Date

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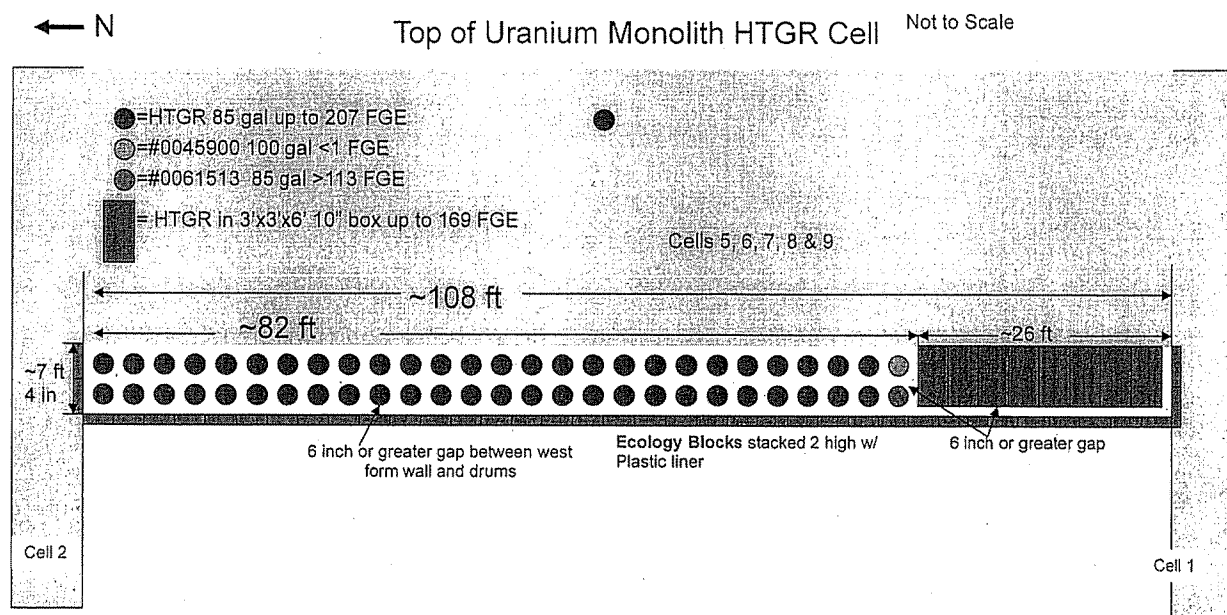
DOCUMENTATION OF ADEQUACY OF CSER(S) APPROVAL FORM

ACF SWOC-10-05 Rev. 0: *Disposal of High Temperature Gas Reactor (HTGR) Fuel*

Describe the scope of and proposed changes to expected normal conditions and unlikely upset events:

The Waste Retrieval Project wants to grout 62 containers into a monolith at the Mixed Waste Trench (MWT). The proposed loading of the mixed waste trench is shown in Figure 1. The location of each drum will be tracked to adequately maintain the MWT areal density.

Figure 1:



The 52, 85-gallon HTGR drums and 2 miscellaneous drums will be placed in 2 rows of 27 drums each. Each HTGR drum will be set in place with a nominal, 8 inch spacing between drums. The spacing between drums (8 inches) or the center-to-center spacing between drums (3 ft.) will be physically verified prior to the initial pour. Drums/boxes may be placed in contact with the north, south, and east walls of the existing trench monolith. The drums will be set in place with an initial 6 – 10 inch deep grout pour. Proper drum placement will be visually verified after the initial pour to ensure no significant drum movement (6 in. or more) was caused by the initial pour. The 8 HTGR boxes will be placed in one row. The boxes will be placed with at least a 6 inch gap from the drums and on the west end. There will be no spacing between the boxes or between the boxes and the south side of trench.

Drum #0061513 will be placed in the same manner as the HTGR drums. Since Drum #0045900 is fissile exempt (contains less than 1 FGE), it may be placed anywhere with no required spacing.

DOCUMENTATION OF ADEQUACY OF CSER(S) APPROVAL FORM

ACF SWOC-10-05 Rev. 0: Disposal of High Temperature Gas Reactor (HTGR) Fuel

SWITS indicates that there is no container with greater than 1 FGE per sq. ft. to the north, east, south, and below the proposed location (excepting the uranium fuel monolith addressed in CSER 03-014 addendum 1).

The HTGR fuel is well characterized because it was used in experiments in the late 1960s, early 1970s (ref. CSER 01-013 rev. 1). The fuel is composed of a microsphere (grain) of either UC_2 , UO_2 , or PuO_2 . The uranium is primarily either ^{235}U (93.7 wt.%) or ^{233}U (97.5 wt.%) while the plutonium has a 77.1 wt.% ^{239}Pu content. ONLY those containers containing the uranium based fuel will be buried at the MWT. The drums may also contain some thorium (ThO_2) and vanadium (V_2O_3). The microspheres were generally coated with multiple layers of graphite, mixed with graphite frit, and placed into channels in blocks of graphite. The exact configuration of each drum is not known but the general configuration is as follows: the graphite block is bagged, centered within a 30 gallon drum or can, centered within a 55 gallon, and placed into an 85 gallon drum. Vermiculite may have been used to aide in centering the various cans/drums and concrete may have been used as shielding between the 30 gallon drum and the 55 gallon drum.

Identify the applicable CPSs and CSERs:

CSER 03-014 rev. 0A

CPS-SW-008

Identify the appropriate limit set for the changed operation and how the applicable CPSs need to be changed:

Existing limits and controls from CSER 03-014 as implemented thru CPS-SW-008 are adequate for the proposed operation. No changes are necessary. A work package will be developed to perform this activity that will specify the grouting protocol, spacing verification, and container identification verification.

Explain how the CPS changes are supported by the CSER(s):

The current CSER provides adequate support for limits and controls in the CPS. No changes to the CPS are required in terms of actual limits and controls. The proposed trench loading is below the 42.4 FGE per sq. ft. limit specified in CSER 03-014. Table 1 lists the resulting areal density for each of the drums. The highest areal density is 23 FGE per sq. ft. with the 3 feet spacing which would still allow other material to be stacked on top of that location. Note the areal densities for the HTGR boxes were conservatively calculated based on the 85 gallon drum or 3 ft. square dimensions.

DOCUMENTATION OF ADEQUACY OF CSER(S) APPROVAL FORM

ACF SWOC-10-05 Rev. 0: *Disposal of High Temperature Gas Reactor (HTGR) Fuel*

Table 1: Fissile Loading for HTGR Containers

Container	SWITS Total FGE	Areal Density (FGE/sq. ft.)			Density ¹ (FGE/liter)	FGE per Drum Eq. Vol. ²
		85-gal drum (26 in. tri. pitch)	85-gal drum (26 in. sq. pitch)	3 ft. by 3 ft.		
0038686	207.1	56.5	47.8	23.0	0.24	50.7
0041874	179.1	48.9	41.3	19.9	0.21	43.9
0042082	177.8	48.5	41.0	19.8	0.21	43.5
0043130	169.4	46.3	39.1	18.8	0.20	41.5
0043121	169.4	46.2	39.1	18.8	0.20	41.5
0042228	169.4	46.2	39.1	18.8	0.20	41.5
0042335	169.4	46.2	39.1	18.8	0.20	41.5
0042312	169.4	46.2	39.1	18.8	0.20	41.5
0042229	169.4	46.2	39.1	18.8	0.20	41.5
0042329	169.4	46.2	39.1	18.8	0.20	41.5
0042306	169.4	46.2	39.1	18.8	0.20	41.5
0043129	169.4	46.2	39.1	18.8	0.20	41.5
0046402	168.5	46.0	38.9	18.7	0.20	41.2
0055749 ³	168.5	46.0	38.9	18.7	0.20	41.2
0047693 ³	168.5	46.0	38.9	18.7	0.20	41.2
0055750 ³	168.5	46.0	38.9	18.7	0.20	41.2
0047704 ³	168.5	46.0	38.9	18.7	0.20	41.2
0047713 ³	168.5	46.0	38.9	18.7	0.20	41.2
0047714 ³	168.5	46.0	38.9	18.7	0.20	41.2
0047703 ³	168.5	46.0	38.9	18.7	0.20	41.2
0055751 ³	168.5	46.0	38.9	18.7	0.20	41.2
0046874	168.5	46.0	38.9	18.7	0.20	41.2
0046897	168.5	46.0	38.9	18.7	0.20	41.2
0041882	168.5	46.0	38.9	18.7	0.20	41.2
0046383	168.5	46.0	38.9	18.7	0.20	41.2
0046326	168.5	46.0	38.9	18.7	0.20	41.2
0046875	168.5	46.0	38.9	18.7	0.20	41.2
0046287	168.5	46.0	38.9	18.7	0.20	41.2
0041863	168.5	46.0	38.9	18.7	0.20	41.2
0041970	168.5	46.0	38.9	18.7	0.20	41.2
0046901	168.5	46.0	38.9	18.7	0.20	41.2
0046788	168.5	46.0	38.9	18.7	0.20	41.2
0039509	168.5	46.0	38.9	18.7	0.20	41.2
0041860	168.5	46.0	38.9	18.7	0.20	41.2
0041876	166.7	45.5	38.5	18.5	0.20	40.8

DOCUMENTATION OF ADEQUACY OF CSER(S) APPROVAL FORM

ACF SWOC-10-05 Rev. 0: *Disposal of High Temperature Gas Reactor (HTGR) Fuel*

Container	SWITS Total FGE	Areal Density (FGE/sq. ft.)			Density ¹ (FGE/liter)	FGE per Drum Eq. Vol. ²
		85-gal drum (26 in. tri. pitch)	85-gal drum (26 in. sq. pitch)	3 ft. by 3 ft.		
0041857	153.6	41.9	35.4	17.1	0.18	37.6
0041979	121.4	33.1	28.0	13.5	0.14	29.7
0046385	121.4	33.1	28.0	13.5	0.14	29.7
0046309	121.4	33.1	28.0	13.5	0.14	29.7
0041947	121.4	33.1	28.0	13.5	0.14	29.7
0046338	121.4	33.1	28.0	13.5	0.14	29.7
0046386	121.4	33.1	28.0	13.5	0.14	29.7
0046294	121.4	33.1	28.0	13.5	0.14	29.7
0041948	121.4	33.1	28.0	13.5	0.14	29.7
0041963	121.4	33.1	28.0	13.5	0.14	29.7
0046343	121.4	33.1	28.0	13.5	0.14	29.7
0041897	114.8	31.4	26.5	12.8	0.14	28.1
0041898	114.8	31.4	26.5	12.8	0.14	28.1
0046346	114.8	31.4	26.5	12.8	0.14	28.1
0041869	114.8	31.4	26.5	12.8	0.14	28.1
0041964	114.8	31.4	26.5	12.8	0.14	28.1
0041858	114.8	31.4	26.5	12.8	0.14	28.1
0046394	114.8	31.4	26.5	12.8	0.14	28.1
0041971	114.8	31.4	26.5	12.8	0.14	28.1
0041955	114.8	31.4	26.5	12.8	0.14	28.1
0046405	114.8	31.4	26.5	12.8	0.14	28.1
0046298	114.8	31.4	26.5	12.8	0.14	28.1
0041873	100.9	27.5	23.3	11.2	0.12	24.7
0041867	95.1	26.0	21.9	10.6	0.11	23.3
0042243	22.9	6.3	5.3	2.5	0.03	5.6
0061513	113.7	31.0	26.2	12.6	0.13	27.8
Total	8923.64					

¹ Volume is 3 ft. by 3 ft. by 40 in. (height of 85 gallon drum)² Drum Equivalent Volume is equal to 208 liters (55-gallon drum)³ HTGR drum overpacked in a 3 ft. by 3 ft by 6 ft. 10 in. box

CSER 03-014 provides the justification for the 42.4 FGE per sq. ft. loading. With the 3 ft. spacing, the proposed loading is much less than the prescribed areal density for the burial grounds – one half the limit or less. Even if the drums are placed side-by-side the resulting areal density, at most, would nominally be 46.3 FGE per sq. ft. (three drums have an areal density larger than 46.3 FGE/sq. ft.) which is marginally over the 42.4 FGE per sq. ft. limit but is much less than the critical areal densities of 390 g ²³⁵U per sq. ft (240 g ²³⁹Pu per sq. ft.). All of the drums but one (the highest FGE content drum) would fall below the 42.4 FGE/sq. ft. limit using

DOCUMENTATION OF ADEQUACY OF CSER(S) APPROVAL FORM

ACF SWOC-10-05 Rev. 0: *Disposal of High Temperature Gas Reactor (HTGR) Fuel*

a 26 inch square pitch. Using the gross fissile mass, 8924 FGE, and the overall area, 108 ft. by 6 ft., of the propose monolith, provides an areal density of 13.8 FGE/sq. ft. Since these drums could be placed side-by-side in square pitch array and be within limits (except for only one drum), the important issue here is not controlling the spacing between drums but to document and track the spacing and corresponding areal density for future burial ground loading.

With no new limits or controls to be implemented, a Criticality Control Review (CCR) would not normally be performed. However, since the source CSER, CSER 03-014 rev. 0A has never had a CCR conducted on the limits and controls, a CCR will be performed on the CSER.

Explain why the upset events of the CSER(s) are conservative relative to the credible upset events of the proposed operation:

The proposed loading complies with the stated requirements in CSER 03-014. No new events are produced by the proposed trench loading protocol.

Walkdown / Package Prep Sheet

Assigned Planner: Carla Wheatley

Package Number:	2X-10-05054/W	Date Started	10/05/10	Date Due	11/8/10
Package Title:	Dispose of Category 3 HTGR Fuel Drums in Cell#11			Priority:	2
Location:	A-120	Time:	1:30	Date:	10/28/10

Discipline	Print Name	Signature	Date
Design Authority:			
Operations:			
OH&IS:	Fred Kehn	[Signature]	10/28/10
FWS / PIC:	Stuart Arnold	[Signature]	10/28/10
RadCon Screener:	John Miller	[Signature]	
RCT:			
NCO:	SEAN LARSON	Sean Larson	10-28-10
PF:			
MW:	[Signature]	Terry Whitcomb	10-28-10
Elect:			
Teamster:			
Carpenter:			
Ironworker:	DAVE JOHNSON	[Signature]	10-8-10
Crane Operator:	Sean McFadden	[Signature]	11-8-2010
Other: Boilermaker	DENNIS CARROLL	[Signature]	10-28-10
Other: WMR	R.J. SWAN	[Signature]	10-28-10
Other: ECO	N. Ware	Nancy Ware	10-28-10
Other: QAE	K. Goode	[Signature]	10/28/10
Other: MW	Dennis Harrington	[Signature]	10-28-10

Check Items Required and then Check when Complete:								
Item	Required	Complete	Item	Required	Complete	Item	Required	Complete
AJHA	X		WPG	X		FMP		
RRSF	X		NEPA	X		PFWR		
RWP	X		USQ	X		EX. Pmt		
AMW	X		CLP			Scanning		

Other CEMENT FINISHES Paul Jeppson
 other Cement Finisher DAVE Schmitz

Paul Jeppson
 David M. Schmitz

11/8/10

Wheatley, Carla J

From: Arnold, Stuart G
Sent: Tuesday, December 07, 2010 4:04 PM
To: Conley, Jeffrey A; Wheatley, Carla J
Cc: Pyzel, Donald R
Subject: FW: Ecology treatment in trench notification complete

FYI

From: Miskho, Anthony G
Sent: Tuesday, December 07, 2010 3:57 PM
To: Austin, Richard L
Cc: Ramirez, Amanda J; Catlow, Rene L; Nester, Dean E; Cornelison, Chad; Lang, John J; Beiers, E Orinda; Flyckt, Don L; Arnold, Stuart G
Subject: Ecology treatment in trench notification complete

Rick:
Mike Collins just called and indicated that he considers the notification to Ecology to be complete. Please proceed to release the work.
Thanks
Tony

PROJECT: Cat III Waste Stabilization
 CONTRACTOR: M & EC

		psi	psi	Average ps	Mpa
3 - Day Cylinder	08/01/09			0	0
7 - Day Cylinder	08/05/09	3300	3290	3295	23
28 - Day Cylinder	08/26/09	5110	5270	5190	36
56 - Day Cylinder	09/23/09			0	0

Mix # 4100023

Company:

American Rock Products

1 Cu. Yd. S.S.D.

Laboratory Batch Size

Ingredient	Lbs.	S.G./SSD	Volume	Weight	0.037	H2O Adj.
Cement	470	3.15	2.39	17.39	Lbs.	0.00%
Silica Fume		2.20	0.00	0.00	Lbs.	0.00%
Fly Ash	470	2.40	3.14	17.39	Lbs.	0.00%
Steel Fiber	0	3.50	0.00	0.00	Lbs.	0.00%
1-1/2" X 3/4"		2.76	0.00	0.00	Lbs.	0.00%
3/4" X #4	0	2.76	0.00	0.00	Lbs.	0.00%
1/2" X #4		2.76	0.00	0.00	Lbs.	
3/8" X #4	0	2.76	0.00	0.00	Lbs.	
Fine Sand	0	2.65	0.00	0.00	Lbs.	
Coarse Sand	2432	2.73	14.28	2432.00	89.98	Lbs.
Water	400	1.00	6.41	400.00	14.80	Lbs.
Admixtures:	oz/yd	oz/cwt		oz/batch	cc/batch	
Glenium 3030	20.00			0.74	22	0.43 Actual W/C Ratio
Pozzolith 80	0.00			0.00	0	Water Weigh Back
Pozzolith NC534	23.50			0.87	26	0.00 Lbs./cu. yd
Rheomac VMA 358	0.00			0.00	0	400.00 Total Mix Water
MBAE90	15.00	or/as needed	0.81	0.56	16	
Delvo	0.00			0.00	0	
Total	3772 Lbs		27.03			

Aggregate Totals 2432
 Calc. Unit Wt. 139.57
 W/C Ratio 0.43
 Slump Fluid
 Design Air Content 3.00%

	Actual Weights	
Cement		
Silica		
Fly Ash	322N	
Steel Fiber	NC534	
1-1/2"	VMA 358	
3/4" X #4	MBAE90	
1/2" X #4	Delvo	
3/8" X #4		
Fine Sand	Total	0
C/ Sand	Batch Size	
Water		
W/C	#VALUE!	Total/yd3
		#DIV/0!



Richland Office APPENDIX Z
(509) 375-1021
(509) 375-5194 Fax

2090 Robertson Drive
Richland, WA 99354

AR 136711

SOLD TO:

SHIP TO:

M&EC-MATERIALS & ENERGY CORP 1090
9

200 West, Hanford Site WAYNE SHA
NNON 528-8037

DATE	TIME	FORMULA #	YARDS ORD.	TRUCK #	DRIVER	BATCH #	LOAD #	YARDS DEL.	P.O. #
03/10/11	9:08	4100023	25	0100	NOEL P	1139776	4	18	M&EC-00

WARNING

IRRITATING TO THE SKIN AND EYES

Contains Portland Cement. Wear Rubber Boots and Gloves. PROLONGED CONTACT MAY CAUSE BURNS. Avoid Contact With Eyes and Prolonged Contact With Skin. In Case of Contact With Skin or Eyes, Flush Thoroughly With Water. If Irritation Persists, Get Medical Attention. KEEP CHILDREN AWAY.

CONCRETE is a PERISHABLE COMMODITY and BECOMES the PROPERTY of the PURCHASER UPON LEAVING the PLANT. ANY CHANGES or CANCELLATION of ORIGINAL INSTRUCTIONS MUST be TELEPHONED to the OFFICE BEFORE LOADING STARTS.

- The undersigned promises to pay all costs, including reasonable attorney's fees, incurred in collecting any sums owed.
- All accounts not paid within 30 days of delivery will bear interest at the rate of 18% per annum.
- Not Responsible for Reactive Aggregate or Color Quality. No Claim Allowed Unless Made at Time Material is Delivered.
- A \$25.00 Service Charge and Loss of the Cash Discount will be Collected on all returned Checks.

PROPERTY DAMAGE RELEASE

(TO BE SIGNED IF DELIVERY TO BE MADE INSIDE CURB LINE)

Dear Customer - The driver of this truck in presenting this RELEASE to you for your signature is of the opinion that the size and weight of his truck may possibly cause damage to the premises and/or adjacent property if he places the material in this load where you desire it. It is our wish to help you in every way that we can, but in order to do this the driver is requesting that you sign this RELEASE relieving him and this supplier from any responsibility from any damage that may occur to the premises and/or adjacent property, buildings, sidewalks, driveways, curbs, etc., by the delivery of this material, and that you also agree to help him remove mud from the wheels of his vehicle so that he will not litter the public street. Further, as an additional consideration, the undersigned agrees to indemnify and hold harmless the driver of this truck and this supplier for any and all damage to the premises and/or adjacent property which may be claimed by anyone to have arisen out of delivery of this order.

EXCESSIVE WATER IS DETRIMENTAL TO CONCRETE PERFORMANCE H₂O ADDED BY REQUEST / AUTHORIZED BY:
NOTICE: MY SIGNATURE BELOW INDICATES THAT I HAVE READ THE HEALTH WARNING NOTICE AND SUPPLIER WILL NOT BE RESPONSIBLE FOR ANY DAMAGE CAUSED WHEN DELIVERING INSIDE CURB LINE

ARRIVED AT _____ SLUMP

GALLONS ADDED _____ TO _____ YDS

GALLONS ADDED _____ TO _____ YDS

GALLONS ADDED _____ TO _____ YDS

GALLONS ADDED _____ TO _____ YDS

TOTAL WATER ADDED _____

QUANTITY	DESCRIPTION	UNIT PRICE	EXTENDED
4.50 yd	4100023 2000 PSI GROUT		
4.50 EA	IP9323 MASTER FIBER F 70		
4.50 yd 280	ON9030 GLENIUM 3030		
4.50 CY	ON9949 ENVIRONMENTAL FEE		
6.00 in			

SUBTOTAL

LEFT PLANT	ARRIVED JOB	START UNLOADING	DELAY EXPLANATION/CYLINDER TEST TAKEN	TIME ALLOWED
	957		1 JOB NOT READY 2 SLOW POUR OR PUMP 3 TRUCK AHEAD ON JOB 4 CONTRACTOR BROKE DOWN 5 ADDED WATER	
RETURNED TO PLANT	LEFT JOB	FINISH UNLOADING	6 TRUCK BROKE DOWN 7 ACCIDENT 8 CITATION 9 LOCATION 10 OTHER	DELAY TIME
TOTAL ROUND TRIP	TOTAL AT JOB	UNLOADING TIME		ADDITIONAL CHARGE

TAX CODE	TAX
ADDITIONAL CHARGE	
GRAND TOTAL	

Truck	Driver	User	Disp	Ticket Num	Ticket ID	Time	Date
0100		user		139776	54019	9:08	3/10/11
Load Size	Mix Code	Returned	Qty	Mix Age	Seq	Load ID	
4.50 CYDS	4100023				W	57824	
Material	Design Qty	Required	Batched	% Var	Moisture	Actual Mat	
660MM1	2525 lb	11962 lb	11900 lb	-0.52%	5.28% A	72 gl	
ACT1/II	470.0 lb	2115.0 lb	2150.0 lb	1.65%			
ON9966	470.0 lb	2115.0 lb	2115.0 lb	0.00%			
WATER	48.00 gl	81.01 gl	81.00 gl	-0.02%		81.00 gl	
WATER 2	40.00 gl	54.01 gl	54.00 gl	-0.02%		54.00 gl	
Actual Num Batches:	1						
Load Total:	17292 lb	Design W/C: 0.425	Water/Cement: 0.422 T	Design Water: 216.0 gl	Actual Water: 206.6 gl	To Add: 9.4 gl	
Slump:	6.00 in	Adjust Water: 0.0 gl/Load	Trim Water: -2.0 gl/ CYDS				



Richland Office APPENDIX Z
(509) 375-1021
(509) 375-5194 Fax

2090 Robertson Drive
Richland, WA 99354

AR 136715

SOLD TO:

SHIP TO:

M&EC-MATERIALS & ENERGY CORP 1090
9

200 West, Hanford Site WAYNE SHA
NNDN 525-8037

DATE	TIME	FORMULA #	YARDS ORD.	TRUCK #	DRIVER	BATCH #	LOAD #	YARDS DEL.	P.O. #
03/10/11	9:31	4100023	25	Q104	ART LEE	139780	5	21.5	M&EC-00

WARNING

IRRITATING TO THE SKIN AND EYES

Contains Portland Cement. Wear Rubber Boots and Gloves. PROLONGED CONTACT MAY CAUSE BURNS. Avoid Contact With Eyes and Prolonged Contact With Skin. In Case of Contact With Skin or Eyes, Flush Thoroughly With Water. If Irritation Persists, Get Medical Attention. KEEP CHILDREN AWAY.

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EXCESSIVE WATER IS DETRIMENTAL TO CONCRETE PERFORMANCE H₂O ADDED BY REQUEST / AUTHORIZED BY:

NOTICE: MY SIGNATURE BELOW INDICATES THAT I HAVE READ THE HEALTH WARNING NOTICE AND SUPPLIER WILL NOT BE RESPONSIBLE FOR ANY DAMAGE CAUSED WHEN DELIVERING INSIDE CURB LINE

ARRIVED AT _____ SLUMP

GALLONS ADDED _____ TO _____ YDS

GALLONS ADDED _____ TO _____ YDS

GALLONS ADDED _____ TO _____ YDS

GALLONS ADDED _____ TO _____ YDS

TOTAL WATER ADDED _____

QUANTITY	DESCRIPTION	UNIT PRICE	EXTENDED
3.50 yd	4100023 2000 PSI GROUT		
3.50 EA	IP9323 MASTER FIBER F 70		
140.00 yd	DN3030 GLENIUM 3030		
3.50 cy	DN9949 ENVIRONMENTAL FEE		
210.02 total for Both Tickets 6.00 in			

LEFT PLANT	ARRIVED JOB	START UNLOADING	DELAY EXPLANATION/CYLINDER TEST TAKEN	TIME ALLOWED	SUBTOTAL
			1 JOB NOT READY 2 SLOW POUR OR PUMP 3 TRUCK AHEAD ON JOB 4 CONTRACTOR BROKE DOWN 5 ADDED WATER 6 TRUCK BROKE DOWN 7 ACCIDENT 8 CITATION 9 LOCATION 10 OTHER		
RETURNED TO PLANT	LEFT JOB	FINISH UNLOADING		DELAY TIME	TAX CODE
					TAX
					ADDITIONAL CHARGE
TOTAL ROUND TRIP	TOTAL AT JOB	UNLOADING TIME		ADDITIONAL CHARGE	
					GRAND TOTAL

Truck Driver User Disp Ticket Num Ticket ID Time Date
Q104 user 139780 54023 9:31 3/10/11
Load Size Mix Code Returned Qty Mix Age Seq Load ID
3.50 CYDS 4100023 W 57828

Material	Design Qty	Required	Batched	% Var	Moisture	Actual Wat
660WNI	2525 lb	9267 lb	9220 lb	-0.51%	4.86% A	51 gl
ACTI/II	470.0 lb	1645.0 lb	1660.0 lb	+ 0.91%		
DN9966	470.0 lb	1645.0 lb	1675.0 lb	+ 1.82%		
WATER	48.00 gl	65.66 gl	65.00 gl	-1.00%		65.00 gl
WATER 2	40.00 %	43.77 gl	44.00 gl	0.52%		44.00 gl

Actual Num Batches: 1 Manual 9:31:04
Load Total: 13465 lb Design W/C: 0.425 Water/Cement: 0.420 I Design Water: 168.0 gl Actual Water: 160.3 gl To Add: 7.7 gl
Slump: 5.00 in Adjust Water: 0.0 gl/ Load Trim Water: -2.0 gl/ CYDS Note: Manual feed occurred

NEIC VP0928E01

Page 51 of 74

WEIGHMASTER
SIGNATURE X

GALLONS OF WATER
AVAILABLE PER CUBIC YARD

LOAD
RECEIVED BY X

Hanford Federal Facility
Richland, Washington



American Rock Products, Inc.

Richland Office
(509) 375-1021
(509) 375-5194 Fax

2090 Robertson Drive
Richland, WA 99354

AR 136716

SOLD TO:

SHIP TO:

M&EC-MATERIALS & ENERGY CORP 1090
9

200 West, Hanford Site WAYNE SHA
NNON 525-8037

DATE	TIME	FORMULA #	YARDS ORD.	TRUCK #	DRIVER	BATCH #	LOAD #	YARDS DEL.	P.O. #
03/10/11	9:34	4100023	25	0104	ART LEE	13781	6	25	M&EC-00

WARNING

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ARRIVED AT _____ SLUMP

GALLONS ADDED _____ TO _____ YDS

GALLONS ADDED _____ TO _____ YDS

GALLONS ADDED _____ TO _____ YDS

GALLONS ADDED _____ TO _____ YDS

TOTAL WATER ADDED _____

QUANTITY	DESCRIPTION	UNIT PRICE	EXTENDED
3.50 yd	4100023 2000 PSI GROUT		
3.50 EA	IP9323 MASTER FIBER F 70		
3.50 yd	DN3030 GLENIUM 3030		
3.50 cy	DN9949 ENVIRONMENTAL FEE		

210 02 101-1 for Bulk Tickets 6.0017

LEFT PLANT	ARRIVED JOB	START UNLOADING	DELAY EXPLANATION/CYLINDER TEST TAKEN	TIME ALLOWED	SUBTOTAL
			1. JOB NOT READY 2. SLOW POUR OR PUMP 3. TRUCK AHEAD ON JOB 4. CONTRACTOR BROKE DOWN 5. ADDED WATER 6. TRUCK BROKE DOWN 7. ACCIDENT 8. CITATION 9. LOCATION 10. OTHER		
RETURNED TO PLANT	LEFT JOB	FINISH UNLOADING		DELAY TIME	TAX CODE
					TAX
					ADDITIONAL CHARGE
					ADDITIONAL CHARGE
					GRAND TOTAL

Truck	Driver	User	Disc Ticket Num	Ticket ID	Time	Date
0104		User	139751	54024	9:34	3/10/11
Load Size	Mix Code	Returned	Qty	Mix Age	Seq	Load ID
3.50 CYDS	4100023				W	57829
Material	Design Qty	Required	Batched	% Var Moisture	Actual Wat	
600WH1	8525 lb	9261 lb	9200 lb	-0.66%	4.79% A	30 gl
ACT1/II	470.0 lb	1645.0 lb	1645.0 lb	0.00%		
DN9966	470.0 lb	1645.0 lb	1650.0 lb	0.30%		
WATER	48.00 gl	66.10 gl	66.00 gl	-0.16%	66.00 gl	
WATER 2	40.00 gl	44.07 gl	44.00 gl	-0.16%	44.00 gl	
Actual	Num Batches: 1		Handled: 8:34:59			
Load Total:	13413 lb Design W/C: 0.425	Water/Cement: 0.425 T	Design Water: 168.0 gl	Actual Water: 160.5 gl	To Add: 7.5 gl	
Blump:	6.00 lb	Adjust Water: 0.0 gl/Load	Trim Water: -2.0 gl/ CYDS			

NEIC VP0928E01

Page 52 of 74

WEIGHMASTER

SIGNATURE X

GALLONS OF WATER

AVAILABLE PER CUBIC YARD

LOAD

RECEIVED BY X

Hanford Federal Facility
Richland, Washington

HNF-EDC- 08 - 39586

Page 1 of 1

S**EDC (ENGINEERING DOCUMENT CHANGE) FORM****Document Identification**

1. Change Title:
Position Paper on Waste Stabilization

8. Release: Release CACN 301127

Key Words:
stabilize

2. Project No./Work Package No.:

SWSD

3. Review Designators:

N/A ☐ D ☐ P ☐ E ☐ N ☐ R ☐ I ☐ F ☐ Q ☐

Additional Reviewers:

DA ☒ TA ☒ W ☒ ☐ ☐ ☐ ☐

4. Area

5. Building

6. Facility

7. System No.

200W

NA

Low Level Burial
Ground

NA

9. USQ Required? ☐ USQ ☐ CX ☒ NA

No.:

10. Distribution - Name

MSIN

Distribution - Name

MSIN

FK Hamada T4-04

JR Rosser T4-03

DG Saucedo T4-04

JS Sheehan T4-09

MI Wood H8-44

RT Steen T4-04

WR Swift T4-04

11. Change Description (description and reason for requested change):

Position of Solid Waste Engineering on using Hanford-approved formulated grout monoliths for the disposal of Category 3 waste containers.

Approvals

12. Change Originator

TA/DA

Engineering Management/TA Manager

JR Rosser

JR Rosser

FK Hamada

Print/Signature/Date

Print/Signature/Date

Print/Signature/Date

Title Operations

Title Performance Assess. TA

Title Waste Stab. TA

DG Saucedo

MI Wood

JS Sheehan

Print/Signature/Date

Print/Signature/Date

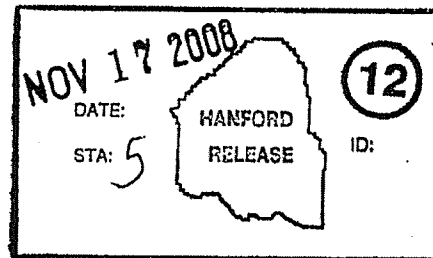
Print/Signature/Date

13. Document Index

Action	Number	Title	Rev (being issued)	Change Page(s)	Config Baseline
N	CHPRC-00048	Position Paper on Waste Stabilization	0	all	<input type="checkbox"/>

14. Potentially Affected Documents Not Modified By This EDC:

Document Type	Document Number/Revision	Document Owner (Organization)	Technical Authority Notified	Date Notified
NA				



RAD only Background for other grouting operations

A-6003-282 (04/04)

S

CHPRC-00048
Revision 0

Position Paper on Waste Stabilization

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-08RL14788



P.O. Box 1600
Richland, Washington 99352

Approved for Public Release;
Further Dissemination Unlimited

CHPRC-00048
Revision 0

EDC #: HNF-EDC-08-39586

Position Paper on Waste Stabilization

Document Type: ES Program/Project: WM

J. R. Rosser
CH2M HILL Plateau Remediation Company

Date Published
November 2008

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-08RL14788

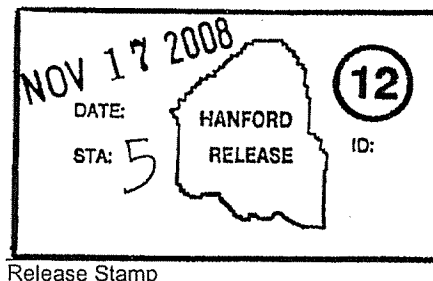


P.O. Box 1600
Richland, Washington

A handwritten signature in black ink, appearing to read "J. R. Rosser".

Release Approval

11-17-08
Date



Approved for Public Release;
Further Dissemination Unlimited

CHPRC-00048
Revision 0

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Printed in the United States of America

Total Pages:

5

CHPRC-00048 *Rev 0***Position Paper on Waste Stabilization**

Solid Waste accepts and disposes Category 3 waste per the requirements of the "Hanford Site Solid Waste Acceptance Criteria", HNF-EP-0063 (EP-0063). EP-0063 is approved by the Department of Energy (DOE) and sets forth the baseline criteria for acceptance of waste within the operating requirements of the Low Level Burial Ground (LLBG), including environmental regulations, DOE Orders, permits, technical safety requirements, waste analysis plans, performance assessments, and other applicable requirements.

EP-0063 states that Category 3 waste can only be disposed if it meets the waste form stability criteria of WHC-EP-0645 and WHC-SD-WM-TI-730. These two documents are the Performance Assessment (PA) for disposal of low level waste in the Hanford 200 West and 200 East LLBG, respectively. The documents were prepared for the DOE Office of Environmental Management and approved for public release. The PA is required by DOE Order 435.1 to demonstrate that a given disposal practice is in compliance with performance objectives quantified in the order. The PA allows larger activity limits for Category 3 waste because it assumes the waste will be buried to meet PA general waste form criteria which ensure adequate isolation of waste from the surrounding environment. Waste that requires stabilization per the PA criteria is coded STW or SMW in the waste receipt records. EP-0063 lists five methods it approves to meet the Category 3 waste form stability criteria of the PA.

- Packaging in a HIC that is procured through WHC-S-0486 specification.
- Packaging in a HIC approved by the WSD Project acceptance organization.
- Placement in a monolith in the LLBG.
- Stabilization in concrete or other stabilization agents. (Several Hanford-approved concrete mix formulas have been developed to meet the leach index and compression strength criteria of the U. S. Nuclear Regulatory Commission (NRC) *Technical Position Paper on Waste Form*, Section C.2 and Appendix A)
- Inherently stable waste that meets the stability requirements of 10 CFR 61.56 and the NRC *Technical Position Paper on Waste Form*.

In 1992 Solid Waste adopted guidelines to stabilize Category 3 waste that mirrored the NRC guidelines to stabilize Class C waste, to ensure compliance with DOE Order 5820.2A for disposing of Category 3 waste. NRC guidelines were used because the PA for the 200W LLBG (WHC-EP-0645) was not published until 1995. Under the NRC guidelines, stability can be provided by placing Class C waste (which is similar to DOE Category 3 waste) in a HIC. The technical guidance for meeting 10 CFR 61 HIC requirements are found in the NRC *Technical Position Paper on Waste Form*. Solid Waste used the NRC guidance document to write a specification for HICs. The specification document was WHC-HS-V-P-0036, "High Integrity Container, 300 Year", dated March 1993. WHC-S-046, "High Integrity Container, 300 Year" replaced this specification in July 1996. WHC-S-046 is listed in EP-0063, as the controlling document used for procuring HICs. Since 1993 Solid Waste has either purchased HICs or constructed monoliths using the specifications outlined in WHC-HS-V-P-0036 and

CHPRC-00048 *Rev D*

WHC-S-046. Even after the PA was published and guidelines for using other methods of stabilizing Category 3 waste were available, Solid Waste continued using HICs. Category 3 waste was being buried in large unlined trenches with little concern for use of trench space and backfilled using heavy equipment without measuring soil compaction. Under these conditions HICs were cost effective and ensured waste stabilization and protection from future subsidence.

In 2003, DOE agreed to limit burial of all waste to lined trenches at Hanford. At the time, Mixed Waste Trench (MWT) 31 and MWT-34 were the only trenches available for disposal of waste. Solid Waste, for the most part, has continued to use HICs or monoliths, constructed per the specifications outlined in WHC-S-046, to dispose of Category 3 waste in MWT-31 and MWT-34. But, as noted, there are other methods of stabilization that meet the PA and EP-0063 requirements. Hanford-approved formulated concrete (grout) has been used to stabilize Category 3 waste in large over packs and in 2005 uranium fuel was disposed in MWT-34 in Hanford-approved formulated grouted monoliths.

There are currently more than 800 Category 3 waste containers staged in the 218-W-5 Burial Ground, awaiting disposal in MWT-31 and MWT-34, which the PA requires to be stabilized. The Interpretive Authority for the PA and the Interpretive Authority for Category 3 waste stabilization have both reviewed the Category 3 waste containers staged in 218-W-5 and approved stabilizing them using Hanford-approved formulated grout monoliths similar to those used for disposal of the uranium fuel waste in 2005. These grouted monoliths cost less and provide more flexibility for different size containers than the monoliths constructed per the specifications outlined in WHC-S-046. The compressive strength of the grouted monoliths (approximately 2000 psi) provides an operating surface that meets the requirements outlined in HNF-17826 "Trench 34 Operational Cover for the Placement of Second Waste Layer". HNF-17826 is Solid Waste's approved standard for constructing compacted soil operational layers over existing waste containers in the mixed waste trenches.

It is the position of Solid Waste Engineering that using Hanford-approved formulated grout monoliths for the disposal of Category 3 waste containers in MWT-31 and MWT-34 will be equivalent to using HICs or monoliths constructed per the specifications outlined in WHC-S-046 because they:

- Meet the stabilization requirements of the PA.
- Meet or exceed the existing operating surface strength requirements.
- Sufficiently protect the waste containers during backfill operations.
- Prevent or limit future subsidence.
- Cost less.
- Provide flexibility for larger or odd shaped containers.

**American Rock Products
2090 Robertson Dr.
Richland, WA 99354**

Mix Submittal

For

CHPRC

Contents

Grout Mix Designs

Cement & Flyash Mill Certification

NRMCA Concrete Plant Certification

WSDOT Aggregate Source Approval

Fiber Mesh Data

APPENDIX Z

American Rock Products Inc.
4100023 Grout w/ 1.5pds Masterfiber F70 per yd
Strength Compressive: 2,000 psi
8/24/2010

Contractor : CHPRC
Source of Concrete : American Rock Products


Weights per Cubic Yard	(Saturated, Surface-Dry)		
	Quantity	Density	Yield, ft ³
ASTM C-150 Type I-II Cement, lb	470	3.150	2.39
ASTM C-618 Class F Fly Ash, lb	470	2.550	2.95
City Water, lb	400	1.000	6.41
Coarse Sand, lb	2,525	2.750	14.71
Total Air, %	2.0 ± 2.0		0.54
			<hr/> <hr/>
		TOTAL	27.01

Water/Cement Ratio, lbs/lb	0.43
Slump, High, in	8.00
Low, in	5.00
Super Plasticizer High, in	11.00
Super Plasticizer Low, in	8.00
Concrete Unit Weight, pcf	143.10
Yield, %	100.0

Exposure Condition : Moderate exposure

Actual batch weights will vary depending on the moisture content of the aggregates. Approval of this mix design carries with it the inclusion of American Rock Products on the distribution list of all test reports.

Prepared by :



Mitch Inabnit

8/24/2010

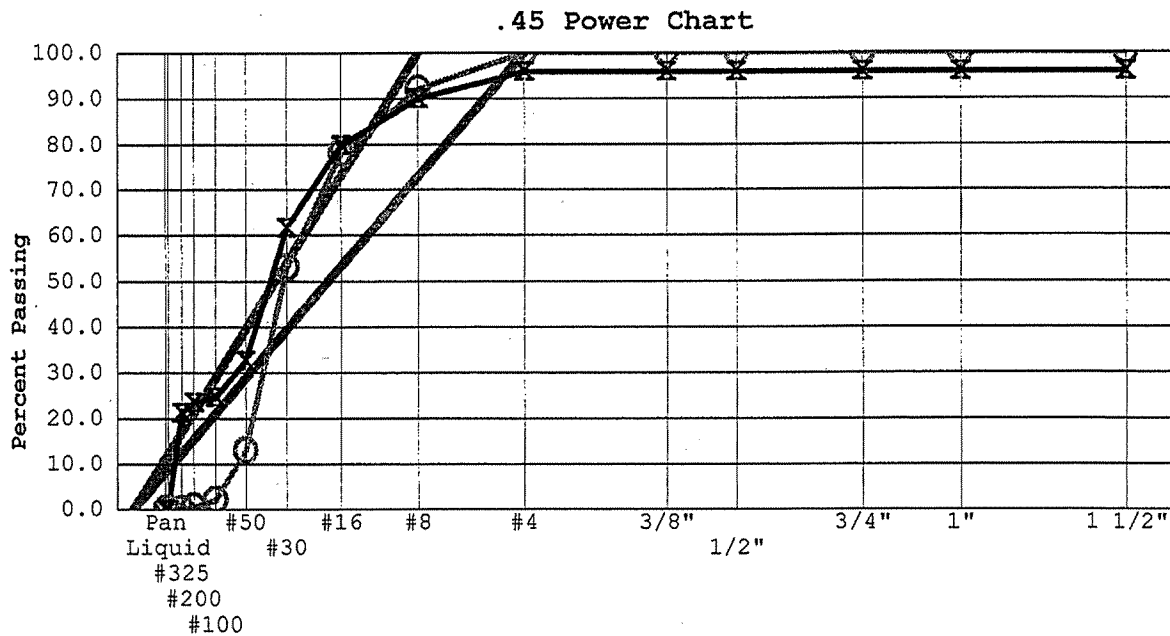
1

4100023 Grout w/ 1.5pds Fibermesh 300 per yd 2,000 ~~pc~~ concrete Mixture Submittal
Full Gradation Analysis

Percent Passing

Sieve	Agg.1	Paste	Total	Aggr.
1 1/2"	-	100.0	100.0	-
1"	-	100.0	100.0	-
3/4"	-	100.0	100.0	-
1/2"	-	100.0	100.0	-
3/8"	-	100.0	100.0	-
#4	100.0	100.0	100.0	100.0
#8	92.0	100.0	95.8	92.0
#16	78.0	100.0	88.5	78.0
#30	53.0	100.0	75.3	53.0
#50	13.0	100.0	54.3	13.0
#100	2.0	100.0	48.6	2.0
#200	0.5	100.0	47.8	0.5
#325	0.0	96.9	46.0	0.0
Liquid	-	58.4	27.7	-
Pan	-	0.0	0.0	-
Fineness Modulus	2.62			
% of Aggregate	100.00			
% of Total	52.48			

Agg.1 : Coarse Sand



■ X Total Solids

■ O Combined Aggregates

8/23/2010

2

APPENDIX Z

AMERICAN ROCK PRODUCTS INC
 2090 ROBERTSON DR
 RICHLAND, WA 99352
 USA
 509-375-1021

Concrete Mix Submittal
 Mix: 4100023 F'c: 2000 psi
 08/23/10

MIX DESCRIPTION

=====

4100023 ----- 2000 psi ----- 0/ 0/ 0

Sample Date	Slump in	Con Tmp deg F	7 day Comp psi	28 day Comp psi	Moving Avg: 3 28 day Comp psi	Moving Std:30 28 day Comp psi	Within C of V 28 day Comp %
12/ 5/ 8	9.00	56	2380	4040	-	-	-
4/ 9/ 9	7.50	65	3160	4585	-	-	-
6/ 9/ 9	7.25	77	3460	4625	4417	-	-
7/29/ 9	6.00	-	3295	5190	4800	-	-
Count -----	4	3	4	4	2	-	-
Average -----	7.44	66	3074	4610	4608	-	-
Standard Deviation -----	1.23	11	478	470	271	-	-
Range -----	6.00	56	2380	4040	4417	-	-
	9.00	77	3460	5190	4800	-	-
Coefficient of Variation -----	16.55	15.96	15.57	10.19	5.88	-	-

ASH GROVE CEMENT COMPANY


RECEIVED

Durkee Plant

 WESTERN REGION
 33080 SHIRTTAIL CREEK ROAD
 P.O. BOX 287
 DURKEE, OREGON 97905
 (541) 877-2411

AUG 18 2010

Mill Analysis No. 10-13

Bin No. 4,D

 Cement Type
 Production Period

 I-II L.A.
 July 1 to July 31

Date 10-Aug-10

STANDARD REQUIREMENTS
 ASTM C - 150

CHEMICAL		Spec.	Test
Item	(C 114)	Limit	Result
SiO ₂ (%)		20.0 min	21.8
Al ₂ O ₃ (%)		6.0 max	3.7
Fe ₂ O ₃ (%)		6.0 max	2.9
CaO (%)		A	64.4
MgO (%)		6.0 max	1.3
SO ₃ (%)		3.0 max	2.6
Loss on ignition (%)		3.0 max	1.36
Na ₂ O (%)		A	0.28
K ₂ O (%)		A	0.43
TiO ₂ (%)		A	0.28
P ₂ O ₅ (%)		A	0.13
Mn ₂ O ₃ (%)		A	0.07
Insoluble Residue (%)		0.75 max	0.23
CO ₂ (%)		A	0.77
Limestone (%)		5.0 max	1.77
CaCO ₃ in Limestone		70 min	99.35
C ₃ S + 4.75C ₃ A		100 max	84
Potential compounds (%)			
C ₃ S		A	60
C ₂ S		A	17
C ₃ A		8.0 max	5
C ₄ AF		A	9
C ₄ AF+2(C ₃ A)		A	19

PHYSICAL		
Item	Spec limit	Test Result
Air content of mortar (volume %)		
C 185	12 max	5.9
Fineness (m ² /kg)		
C 204 (Air permeability)	280 min	388
Autoclave expansion (%)	0.80 max	0.028
C 151		
Compressive strength Psi (Mpa)	Min:	
1 Day	A	2138 (14.7)
3 Days		1450 (10.0) 3560 (24.5)
7 Days		2470 (17.0) 4855 (33.5)
28 Days	A	C
Time of setting (minutes)		
C 191 (Vicat)		
Initial	not less than 45	113
Final	not more than 375	217

OPTIONAL REQUIREMENTS
 ASTM C - 150, (other)

CHEMICAL		Spec.	Test
Item		Limit	Result
C ₃ S + C ₃ A (%)		A	
Equivalent alkalies (%)		0.60 max	0.56

A=not applicable

B= Limit not specified by purchaser.

Test result provided for information only.

C= Test results for this period not available

PHYSICAL		
Item	Spec. Limit	Test Result
False set (%) C 451	50 min	91
Heat of hydration (cal /g)		
7 days	A	78
Compressive strength (Mpa)		
28 Days	28.0	C

We certify that the above described cement, at the time of shipment, meets the chemical and physical requirement of the ASTM C 150 -08 or AASHTO M-85 -08 Type I-II specification also will meet CSA A3001-08 Type GU.

Signature: Mike Raney

Title: Chief Chemist



Cement

FLY ASH TEST REPORT

Analysis by: Lafarge Seattle Concrete Lab
 Sample from : Centralia Power Plant
 Average Analysis: May 1st - May 31st 2010
 Test Report Number 7-10

Chemical Analysis

Silicon Dioxide (SiO ₂)	51.2 %
Aluminum Oxide (Al ₂ O ₃)	15.7 %
Iron Oxide (Fe ₂ O ₃)	6.0 %
Total (SiO ₂) + (Al ₂ O ₃) + (Fe ₂ O ₃)	72.9 %
Sulphur Trioxide (SO ₃)	0.7 %
Calcium Oxide (CaO)	13.3 %
Magnesium Oxide	4.1 %
Moisture Content	0.20 %
Loss on Ignition	0.26 %
Available Alkali as Equiv. Na ₂ O (<i>previous month's result</i>)	2.5 %
Total Alkalies as Equivalent Na ₂ O	4.56 %

Physical Analysis

Fineness Retained on 45 um (No. 325 Sieve)	24.0 %
Strength Activity Index with Portland Cement	
% of Control at 7 Days	86 %
% of Control at 28 Days (<i>previous month's result</i>)	95 %
Water Requirement, Percent of Control	96 %
Autoclave Expansion	0.04 %
Density	2.58 Mg/m ³

Uniformity Requirements

Density, Variation from Average	0.01 %
Fineness 45um Sieve, Variation from Average	0.55 %

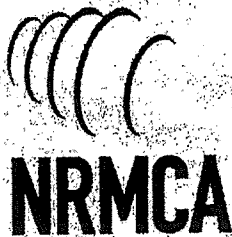
We hereby certify that the composite fly ash sample above meets the chemical and physical requirements of ASTM C618-08 and AASHTO M295-07 for class F and C fly ash.

Certified : 

WESTERN REGION

5400 West Marginal Way SW, Seattle, Washington 98106-1517
 Office: 206.923.0098 or 800.477.0100 Fax: 206.923.0388

National Ready Mixed Concrete Association



Certificate of Conformance For Concrete Production Facilities

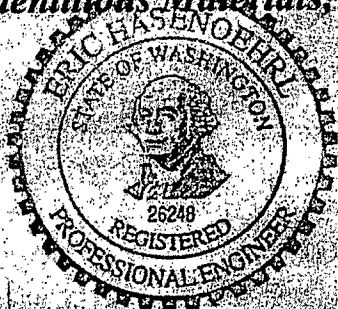
THIS IS TO CERTIFY THAT

Hanford Plant, Richland, WA

American Rock Products

has been inspected by the undersigned licensed professional engineer for conformance with the requirements of the *Check List for Ready Mixed Concrete Production Facilities*. As of the inspection date, the facilities met the requirements for production by

**Central Mixing with Automatic Batching and Recordings of
Cementitious Materials, Aggregate, Water, and Chemical Admixtures**



(Seal)

Eric Hasenochel

Signature of Licensed Professional Engineer

April 26, 2010

Inspection Date

April 26, 2012

Certification Expiration Date

This company will maintain these facilities in compliance with the *Check List* requirements and will correct promptly any deficiencies which develop.

[Signature]

Signature of Company Official

[Signature]

Title of Company Official

NOTICE: The Check List indicates only that plant facilities are satisfactory for the production of concrete when properly operated. Conformance of the concrete itself with specification requirements must be verified by usual inspection methods in accordance with sales agreements.

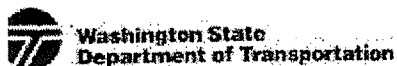
This certificate is issued by the National Ready Mixed Concrete Association on verification that the production facility conforms to the requirements of the NRMCA Certification of Ready Mixed Concrete Production Facilities, QC3. Unauthorized reproduction or misuse of this certificate may result in legal action.

Plant ID #: 802655

Certification ID #: 11809

© 1965, 1992, 2001, 2002, 2006

National Ready Mixed Concrete Association 900 Spring Street • Silver Spring • Maryland 20910



WSDOT MATERIALS LAB

08/24/2010

Aggregate Source Approval Report

Owner: Port of Benton
 Lessee: American Rock Products, Inc.
 Located in: NW 1/4 NE 1/4 Section 27 T10N R28E

Aggregate Source: PS-R-182
 Known as: Hanford Pit
 County: Benton

Remarks:

Pit Run Materials:

Prior to incorporating any of the following into a job, Gradation and Sand Equivalent tests shall be performed to determine if the material does in fact meet specification for the intended use:

Backfill for Rock Wall	Backfill for Sand Drains	Bedding Material for Rigid Pipe
Bedding Material for Thermoplastic Pipe	Blending Sand	Foundation Material for Classes A, B or C
Gravel Backfill for Drains and Drywells	Gravel Backfill for Foundation Class B	Gravel Backfill for Pipe Zone Bedding
Gravel Backfill for Walls	Gravel Borrow	Sand Drainage Blanket
Select or Common Borrow		

No Preliminary Tests are required to be performed by the State Materials Lab

Gravel Base: Test Date: 05/25/2006 Expiration Date: 05/25/2011
 Drainage: Free R Value: 69 Swell Pressure: 0

Contact the Regional Materials Office to request PRELIMINARY SAMPLES be acquired. Evaluation and approval of this site as a source of GRAVEL BASE is required prior to use.

Mineral Agg. and Surfacing: Test Date: 05/30/2006 Expiration Date: 05/30/2011
 Absorption: Apparent Sp. G.: Bulk Sp. G. (SSD): 2.729 Bulk Sp. G.:
 Deg: 87 LA: 18

Currently approved as a source of aggregate for:

ATB	Ballast	BST Crushed Cover Stone
BST Crushed Screenings	Crushed Surfacing Base Course	Crushed Surfacing Key Stone
Crushed Surfacing Top Course	Gravel Backfill for Foundation Class A	HMA Other Courses
HMA Wearing Course	Maintenance Rock	Permeable Ballast

Acceptance tests need to be performed as necessary.

Portland Cement Concrete Aggregates: Test Date: 06/14/2006 Expiration Date: 06/14/2011
 ASR - 14 Day : 0.58 ASR - One Year: 0.027 CCA Absorption: 0.72 CCA Sp.G: 2.738
 FCA Absorption: 2.44 FCA Organics: 2 FCA Sp. G: 2.726 LA: 17
 Mortar Strength: Petrographic Analysis:

Currently approved for:
 Coarse Concrete Aggregates
 Fine Concrete Aggregates

Acceptance tests need to be performed as necessary

Riprap and Quarry Spalls: Test Date: 05/30/2006 Expiration Date:
 Absorption: Apparent Sp. G.: Bulk Sp. G. (SSD): 2.729 Bulk Sp. G.:
 Deg: 87 LA: 18

Contact the Regional Materials Office to request PRELIMINARY SAMPLES be acquired. Evaluation and approval of this site as a source of RIP RAP AND



The Chemical Company

3	Product Data	
	03 30 00	Cast-in-Place Concrete
	03 40 00	Precast Concrete
	03 70 00	Mass Concrete

Description

MasterFiber F70, a microsynthetic fiber, is a fibrillated polypropylene fiber manufactured from 100% virgin homopolymer polypropylene resins. MasterFiber F70 meets the requirements of ASTM C 1116/C 1116M, Section 4.1.3, Type III, and Note 2 and the requirements of ICC ES AC308 Sections 3.1.1 (plastic shrinkage reinforcement) and 3.1.2 (shrinkage and temperature reinforcement).

MasterFiber F70 is designed to distribute quickly throughout the concrete mixture. The fibrillation pattern is designed to optimize the mechanical bond between the mortar matrix and the fiber. MasterFiber F70 is an excellent shrinkage and temperature (secondary) reinforcement option when used at 1.5 lb/yd³ (0.9 kg/m³).

Applications

Recommended for use in:

- Residential and commercial slabs-on-ground
- Ultra-thin whitetopping
- Bonded overlays
- Architectural precast products and ornamental elements
- Slope stabilization
- Water treatment plants
- Irrigation ditches/channels

MasterFiber™ F70

Fibrillated Microsynthetic Fiber

Features

- Excellent distribution
- Excellent shrinkage and temperature reinforcement

Benefits

- Modifies macro-cracking and micro-cracking mechanism
- Reduces plastic settlement
- Extends service life with reduced maintenance
- Enhances fatigue strength
- Enhances impact, pullout and surface abrasion resistance
- Reduces permeability

Performance Characteristics

Physical Properties

Specific Gravity	0.91
Melting Point	320 °F (160 °C)
Ignition Point	1094 °F (590 °C)
Water Absorption	Nil
Alkali Resistance	Excellent
Tensile Strength	44 ksi (300 MPa)
Modulus of Elasticity	780 ksi (5.38 GPa)
Tenacity	3.7 g/den
Percent Elongation	13.1%
Available Lengths	0.75 in. (19 mm) and 1.5 in. (38 mm)
Equivalent Diameter	0.026 in. (0.66 mm)

**Master
Builders**

Product Data: MasterFiber F70

Guidelines for Use

Dosage: The recommended dosage of MasterFiber F70 is 1.5 lb/yd³ (0.9 kg/m³).

Mixing: The bags can be introduced at any time during the mixing cycle, except at the same time as the cement. Three to five minutes will be required to disperse the fibers depending on when the product is added to the mixer.

Packaging

MasterFiber F70 is packaged in pre-weighed degradable 1.0 lb (0.45 kg), 1.5 lb (0.7 kg) and 7.5 lb (3.4 kg) bags that can be added directly to the mixing system.

Product Notes

MasterFiber F70 is not a replacement for structural steel reinforcement and therefore, should not be used to replace any of the load-carrying steel reinforcement in a concrete element.

Engineering Specifications

MasterFiber F70, at 1.5 lb/yd³ (0.9 kg/m³), is an option to conventional secondary reinforcement in structural plain concrete. MasterFiber F70 outperforms other microsynthetic fibers in providing an optimum three-dimensional shrinkage and temperature reinforcement system in concrete.

MasterFiber F70 meets the requirements of ASTM C 1116/ C 1116M, Section 4.1.3, Type III, and Note 2, and ICC ES AC32, Sections 3.1.1 and 3.1.2.

Related Documents

Material Safety Data Sheets: MasterFiber F70

Additional Information

For additional information on MasterFiber F70, contact your local sales representative.

The Admixture Systems business of BASF Construction Chemicals is a leading provider of innovative admixtures for specialty concrete used in the ready-mixed, precast, manufactured concrete products, underground construction and paving markets throughout the North American region. The Company's respected Master Builders brand products are used to improve the placing, pumping, finishing, appearance and performance characteristics of concrete.

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Admixture Systems

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Canada 1800 Clark Boulevard, Brampton, Ontario L6T 4M7 • Tel: 800 387-5862 • Fax: 905 792-0651

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American Rock Products

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Ready Mix Concrete, Pre-Mixed Concrete, Transit Mixed Concrete. Grout and Controlled Density Fill MSDS covers all Concrete Mix Designs prepared by American Rock Products.

CAS No: N/A

Product Use: Ready Mix Concrete is a structural component used in structural and civil engineering.

MSDS Information: This product is classified as hazardous, according to criteria of WHMIS regulations.

Product Code:

Chemical Family: N/A

Chemical Name And Synonyms: N/A

Formula: This product consists of portland cement, flyash, sand, aggregate, and admixtures, individual compositions of constituents will vary within the mix design ranges.

Supplier/Manufacturer: American Rock Products

Emergency Contact Information: American Rock Products 509-375-1021

SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

Ready Mix Concrete Ingredients & Their Exposure Limits:

Current ACIH TLV for 8 hour Exposure

Chemical Entity/Ingredient	CAS No:	Percentage of Mix	Total Dust (Mass) mg/m ³	Respirable Dust (Mass) mg/m ³
Crushed stone or gravel		0 to 60	10 mg/m ³	5 mg/m ³
Sand		1 to 50	10 mg/m ³	5 mg/m ³
Portland Cement	65997-15-1	1 to 25	10 mg/m ³	5 mg/m ³
Water				
Fly Ash		1 to 25	10 mg/m ³	5 mg/m ³
Crystalline Silica	14808-60-7	0.01 to 5	2 mg/m ³	0.05 mg/m ³

Note:

Cements and sand and gravel may contain 0.1% - 60% crystalline silica (CAS No. 14808-60-7) depending on the proportion and crystalline silica content of the ingredients. All ingredients may contain crystalline silica. Wet stage poses no risk or hazard.

American Rock Products

SECTION 3 – HAZARDS IDENTIFICATION

Emergency Overview:

Concrete is a light gray fluid mixture that poses an immediate hazard to eye tissue. Exposure of sufficient duration to wet concrete can cause serious, potentially irreversible tissue (skin or eye) destruction in the form of chemical (caustic) burns, including third degree burns.

If footwear or clothing becomes saturated with wet concrete, remove immediately and wash area with water and mild soap. Do not allow prolonged contact.

Potential Health Effects:

- Relevant routes of exposure are:
- EYE CONTACT and SKIN CONTACT

Effects Resulting From EYE CONTACT:

Exposure to wet concrete may cause immediate or delayed irritation or inflammation. Eye contact by splashes of wet concrete may cause effects ranging from moderate eye irritation to chemical burns and blindness. Such exposures require immediate first aid and medical attention to prevent significant damage to the eye.

Effects Resulting From SKIN CONTACT:

Discomfort or pain cannot be relied upon to alert a person to a hazardous skin exposure. Consequently, the only effective means of avoiding skin injury or illness involves minimizing skin contact, particularly contact with wet concrete. Exposed persons may not feel discomfort until hours after the exposure has ended and significant injury has occurred.

Exposure to moist or wet concrete may cause more severe skin effects including thickening, cracking, fissuring of the skin. Prolonged exposure can cause severe skin damage in the form of (caustic) chemical burns.

Effects Resulting From INHALATION:

Concrete may contain amounts of crystalline silica. Prolonged exposure to respirable free crystalline silica may aggravate other lung conditions. It may also cause delayed lung injury including silicosis, a disabling and potentially fatal lung disease, and/or other diseases. (Also see "Carcinogenic Potential" below.)

Respirable exposure to silica in concrete may occur only if concrete is drilled, cut, ground or polished. Exposure to concrete dust may cause irritation to the moist mucous membranes of the nose, throat, and upper respiratory system. The dust may also leave unpleasant deposits in the nose.

Effects Resulting From INGESTION:

Not Applicable

- Chronic Effects

Some individuals may exhibit an allergic response upon exposure to ready-mix concrete. The response may appear in a variety of forms ranging from a mild rash to severe skin ulcers. Persons already sensitized may react to their first contact with the product. Others may first experience this effect after years of contact with ready-mix concrete. Minimizing contact with skin is the basic protection to reduce this exposure.

American Rock Products

- **Carcinogenic Potential**

Ready Mix Concrete is not listed as a carcinogen by NTP, OSHA, or IARC. It may, however, contain trace amounts of substances listed as carcinogens by those organizations.

Crystalline silica, a potential trace level contaminant in portland cement, is found in the aggregate components in varying percentages and is classified by IRAC as a known human carcinogen (Group 1). NTP has characterized respirable silica as "reasonably anticipated to be [a] carcinogen".

- **Medical Conditions That May Be Aggravated By Inhalation or Dermal Exposure:**

- ◊ Pre-existing upper respiratory and lung diseases.
- ◊ Previous exposure to dust from hardened product.
- ◊ Unusual or (hyper) sensitivity to hexavalent chromium (chromium (+6)) salts.

SECTION 4 – FIRST AID MEASURES

- **Eyes**

Immediately flush eyes thoroughly with water. Continue flushing for 15 minutes, including under the lids, for at least 15 minutes. Seek medical attention immediately.

- **Skin**

Wash skin with water and pH neutral soap or mild detergent intended for use on skin.

If clothing or footwear is saturated remove immediately and wash area with water and mild soap. If contact has been severe enough to cause reddening or actual burns to skin, place sterile bandage on area and seek medical attention.

- **Inhalation**

In wet form, concrete cannot be inhaled.

- **Ingestion**

In wet form, concrete is unlikely to be ingested. If concrete enters mouth, wash out with water immediately. Seek medical attention if any burning sensation or actual burns occur.

SECTION 5 – FIRE EXPLOSION DATA / FIRE FIGHTING MEASURES

Flammability:	Not Flammable.	Flash Point:	Not Applicable.
Lower Explosive Limit:	Not Applicable.	Upper Explosive Limit:	Not Applicable.
Auto ignition Temperature:	Not Applicable.	Sensitivity To Static Discharge:	Not Applicable.
Sensitivity To Impact:	Not Applicable.	Extinguishing Media:	Not Applicable.
Special Fire-Fighting Procedures:	None.	Hazardous Combustion Products:	Not Applicable.
Unusual Fire And Explosion Hazards:	Not Applicable.		

American Rock Products

SECTION 6 – STABILITY AND REACTIVITY

Stability:	Stable
Incompatibility:	Portland cement reacts with water to produce a caustic solution, pH 12 to pH 13. Wet concrete is alkaline. As such it is incompatible with acids, ammonium salts, and aluminum metal. Aluminum powder and other alkali and alkaline earth elements will react in wet mortar or concrete, liberating hydrogen gas. Concrete dissolves in hydrofluoric acid producing corrosive silicon tetrafluoride gas. Silicates react with powerful oxidizers such as fluorine, chlorine, trifluorides, and oxygen difluoride.
Hazardous Decomposition:	Will not occur.
Hazardous Polymerization:	Will not occur.

SECTION 7 - HANDLING AND STORAGE

Normal temperatures and pressures do not affect the material.

Promptly remove dusty clothing or clothing which is wet with concrete fluids and launder before reuse. Wash thoroughly after exposure to dust or wet cement mixtures or fluids.

Ready Mix Concrete is premixed at a plant or in a truck mixer drum and delivered to the end user in semi-fluid state ready to be placed to set in final form.

SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

Eye Protection:

Safety glasses with side shields, or goggles, should be worn when engaged in activities where cement dust, wet cement, or concrete could contact the eye. In extremely dusty environments and unpredictable environments, wear unvented or indirectly vented goggles to avoid eye irritation or injury. Contact lenses should not be worn when working with ready mix concrete or fresh concrete products.

Skin Protection:

Prevention is essential to avoid potentially severe skin injury. Avoid contact with unhardened (wet) concrete products. If contact occurs, promptly wash affected area with soap and water. Wear impervious clothing and gloves to eliminate skin contact where prolonged exposure to unhardened ready mix concrete products might occur. Wear boots that are impervious to water to eliminate foot and ankle exposure. If standing in wet concrete rubber boots must be worn to prevent injury.

Wet concrete may splash into open boot tops and saturate socks and remain in contact for a lengthy period of time. Prevention is to ensure that boots are fully laced up.

Do not rely on barrier creams; barrier creams should not be used in place of gloves.

Periodically wash areas in contact with dry portland cement, wet cement, or concrete fluids with a pH-neutral soap. Wash again at the end of workday. If irritation occurs, immediately wash the affected area and seek treatment. Clothing saturated with wet concrete should be removed immediately and replaced with clean, dry clothing. Do not allow clothing saturated with wet concrete to remain in contact with skin for any period of time.

American Rock Products

Respiratory Protection:

Avoid actions that cause dust to become airborne. Use local or general ventilation to control exposures to below applicable exposure limits.

Use NIOSH/MSHA-approved (under 30 CFR 11) or NIOSH-approved (under 42 CFR 84 after July 10, 1998) respirators in poorly ventilated areas, if an applicable exposure limit is exceeded, or when dust causes discomfort or irritation.

Ventilation:

Use local exhaust or general dilution ventilation to control exposure within applicable limits.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	gray fluid / hydraulic mixture	Odor:	No distinct odor.
Odor Threshold:	Not applicable.	Physical State:	Solid (powder).
pH (as a solid):	Not applicable.	pH:	12 to 13
Solubility In Water:	Not applicable.	Vapor Pressure:	Not applicable.
Vapor Density:	Not applicable.	Boiling Point:	Not applicable (i.e., >1000°C).
Freezing Point:	Not applicable.	Melting Point:	Not applicable.
Specific Gravity (H₂O = 1.0):	3.15	Evaporation Rate:	Not applicable.
Coeff. Water/Oil Dist.:	Not applicable.		

SECTION 10 - TOXICOLOGICAL INFORMATION

Effects Of Acute Exposure:

Wet concrete mixtures can dry the skin, cause alkali burns, and irritate the eyes and upper respiratory tract. Ingestion can cause irritation of the throat.

Effects Of Chronic Exposure:

Dust from concrete can cause inflammation/irritation of the tissue lining the interior of the nose and the cornea (white) of the eye.

SECTION 11 - ECOLOGICAL INFORMATION

Ecotoxicity: No recognized unusual toxicity to plants or animals.

SECTION 12 - DISPOSAL CONSIDERATIONS

Dispose of waste material according to local, provincial, state, and federal regulations. (Since set concrete is stable, allow material to harden).

Dispose in an approved landfill.

American Rock Products

Status under WHMIS:

Portland cement is considered to be a hazardous material under the Hazardous Products Act as defined by the Controlled Products Regulations and is therefore subject to the labeling and MSDS requirements of the Workplace Hazardous Materials Information System (WHMIS).

This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

SECTION 16 - OTHER INFORMATION

Other Important Information:

Concrete should only be used by knowledgeable persons. Vital to using the product safely requires the user to recognize that portland cement chemically reacts with water and that some of the intermediate products of this reaction, during the setting stage, are the cause of the hazards when handling this product.

While the information provided in this material safety data sheet is believed to provide a useful summary of the hazards of concrete, as it is commonly used, one cannot anticipate and provide all of the information that might be needed in every situation. Inexperienced product users should obtain proper training before using this product.

The data furnished in this sheet does not address hazards that may be posed by other materials mixed with concrete. Users should review other relevant material safety data sheets before working with concrete or working with products containing portland cement.

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